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ORIGINAL ARTICLES

ADENOMYOMATA OR TUMORS COMPOSED OF ENDOMETRIAL-LIKE TISSUE*

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DEFINITION

AN adenomyoma is a non-metastasising but invasive benign tumor made up of epithelial glands of endometrial type, stroma of endometrial type and smooth muscle. It is a tumor of endometrial like tissue. It may be either diffuse or discrete. Occasionally when invasive or adhesive it may become a menace to life. It is to be distinguished from fibroid, myoma, fibromyoma and leiomyoma of the uterus. The four last named tumors are different names for the same lesion and are generally called "fibroids." Adenomyomas are also known as endometriomas and they include "chocolate cysts," (Sampson)[1] endometrial hematomas, certain types of salpingitis isthmica nodosa and cysts of endometrial like tissue.

ETIOLOGY

Various theories exist to explain the etiology of adenomyomatous structures. They may be embryonic rests, they may grow from the endometrium through the uterine walls, or they may be due to endometrium flowing into the abdominal cavity during menstruation[2] (Sampson's theory). The adenomyomata of certain regions may be explained by one of these theories, but no theory can explain them all. For example,—diffuse adenomyoma of the uterine wall may be due to down growth of the true endometrium, blood cysts of the ovary containing endometrium may be due to endometrium from the menstruating uterus falling in a fertile region such as a ruptured cyst of an ovary, small peritoneal implants in the pelvis may be due to a ruptured endometrial cyst of the ovary or to the endometrium from the menstruating uterus, but it is difficult to explain a retro-peritoneal nodule in the mesentery containing endometrial tissue or a tumor of the inguinal canal made up of tissue resembling endometrium. No theory as yet advocated has explained all the ectopic endometrium encountered. It is quite possible that Sampson's theory concerning the so-called "chocolate cyst" may be an important etiological factor, but it does not satisfactorily explain all the widely distributed adenomyomata.

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LOCATION

Adenomyomata are found in many regions. In this series of 42 cases they were found as follows:

Diffuse adenomyoma of uterus	21
In discrete tumors of uterus	8
Cornua of uterus	7
Tube	6
Ovary	5
Rectovaginal septum	3
Appendix	1
Round ligament (inguinal canal)	2
Retroperitoneal gland	1
Peritoneum	3
Omentum	2
Ileo-caecal valve	1

Cullen[6] in his article has found these tumors in other areas as follows,—rectus sheath, utero-sacral ligaments, umbilicus.

In this series of cases from the Massachusetts General Hospital the diffuse adenomyoma of the uterus is by far the most common, the tumor found in the inguinal canal and mistaken for a hernia is the most unusual. There have been eight cases of tumors at the cornua of the uterus ranging in size from a pea to an acorn. These are made up of glands similar to uterine glands, some with stroma and some without; some also had a round cell infiltration which seemed inflammatory. These are sometimes classed as salpingitis isthmica nodosa, but they also can be called adenomyoma (Cullen)[6]. In this article these tumors are called adenomyomata. "Chocolate cysts," being cysts of the ovary made up of endometrial-like tissue, are also grouped under the class of adenomyomata.

Inasmuch as the tumors vary very little microscopically it will be well to describe a typical section. The most prominent part of the picture is a gland made up of epithelial cells that are usually columnar in type. About the gland is a stroma made up of loose tissue with round cells, the typical endometrial stroma. About these glands with their stroma are bundles of smooth muscle cells growing in various direc-

tions. The glands may be close together and great in number or there may be a great scarcity of glands with an abundance of stroma. Usually there will be seen areas of old blood pigment about the glands in the stromal tissue; this is hemosiderin, a pigment developed from hemorrhage. Whenever a diagnosis of adenomyoma is made the above elements must be present and all adenomyoma will show a picture which is easily recognizable.

As the symptomatology and physical findings and pathological anatomy differ for each location they will be taken up separately.

Diffuse Adenomyoma of the Uterus

Twenty-one of the cases showed diffuse adenomyoma. In nearly all cases the tumor was evenly distributed through the wall, apparently a growth by direct extension from the endometrium. In a few cases the adenomyoma was in the outer layers of the uterus and had no apparent connection with the endometrium. The latter probably grew from the peritoneal side, from a small implant or from an adherent "chocolate cyst."

The patients came to the clinic to seek relief from excessive menstruation and pelvic pain usually in one side or the other. Nearly all were married and had borne children. The ages varied from thirty-eight to sixty-three years and nearly all were in the third or fourth decade. Excessive bleeding in these cases is probably attributable to the adenomyomatous tissue being a functioning organ and communicating with the uterine cavity. (Cullen.[6]) On pelvic examination the uterus was found to be normal in size or larger than normal and occasionally nodular, suggesting fibroids. At operation a large, soft uterus was found and removed, either to cure the menorrhagia or because of its size. The diagnosis was seldom made before or at operation and it remained for the pathologist to point out the actual disease.

The uterus is usually symmetrical and soft. The endometrium is either normal in depth or thickened as in hypertrophy of the endometrium as is the wall of the uterus. In the thickened wall will be found slit-like cavities, some of which contain old blood (menstrual). The slit-like cavities are down shoots from the endometrium and act like endometrial glands.[6] There is an inner layer containing the slit-like structures which is white and an outer layer of normal smooth muscle which is gray. The gross description of the specimen in case No. 24 W.S. 216157 follows:—"A uterus about 10 cm. in diameter, amputated through the cervix, both tubes and one ovary attached. On section the uterine walls are 3 cm. thick with an inner white coarse fasiculated zone taking up perhaps two-thirds of the wall and an outer zone of thinner construction and more grayish in color. The inner zone contains small slit-like spaces. The tissue as a whole is very pale." In six of the cases of diffuse adenomyoma other pathology of endometrial-like structure was found. In one there was an adenomyoma of the tube, both ovaries, ileo-caecal region and implants on the peritoneum. In five cases there were discrete fibroids containing adenomyomatous tissue.

Adenomyoma in discrete fibroids

There were eight cases of adenomyoma in discrete nodules, either in the uterine wall or subserous. These are regarded as adenomyoma in discrete leiomyoma. It is possible that as the fibroid was forming, perhaps starting near the endometrium, small areas of uterine glands were pinched off and grew in these nodules. The history and physical findings did not differ from that of any fibroid tumor of the uterus.

Cornua of the Uterus

In seven cases the cornua of the uterus contained endometrial-like tissue. The tumors varied in size from one to three cm. in diameter. The isthmus of the tube ran through the center of the nodule. In some cases there were signs of old tubal inflammation and in others the tubes were normal. Salpingitis isthmica nodosa is a name often given to structures of this type, but careful examination of the tumor and its microscopy reveals a structure that is clearly related to adenomyoma. Seven of these cases had been pregnant and four of them had living children. One case also contained definite tubercles in the stroma of the tumor and there was tuberculosis of the uterine endometrium. The symptomatology and physical findings in these cases were not suggestive enough to make a diagnosis of the actual disease present. For pain, tumor, etc., it was decided that exploration of the abdomen was necessary.

Ovarian Adenomyoma

Five cases of ovarian adenomyoma were found and the history and physical findings, operation and pathology of them is most striking. "Chocolate cysts" of the ovary and cysts of endometrial-like tissue have been widely and extensively studied by Sampson of Albany and a detailed description here is not necessary. A hypothetical case in brief,—a woman thirty-three to forty years of age, with no children, dysmenorrhea, constipation (probably increasing), comes for relief of her sterility, her pain and discomfort. Pelvic examination shows a uterus usually retroverted and fused with a mass or masses in the pelvis. At operation the pelvis is filled with adhesions, the ovaries firmly adherent and when freed a chocolate material escapes. The peritoneum is often studded with a dark brown material. A cyst, of about two to ten cm. in diameter, is found in the ovary with

a rough shaggy wall. There may be tiny purplish areas studded on the peritoneum. There may be a tumor in the sigmoid or in the posterior wall of the uterus. All this process is the result of adenomyoma or invasive endometrioma in the pelvis. The cure, if extensive, is supravaginal hysterectomy with removal of both tubes and ovaries. If it is extensive, for instance—if there is a nodule in the sigmoid, and one ovary is left, that tumor will enlarge in size with each menstrual period. With the ovary left in, the tumor continues to menstruate, and with the ovary removed the tumor atrophies as does a uterus when the ovaries have been removed or a uterus after the menopause. Microscopically the ovary, purplish cyst of the peritoneum and nodule on the uterine wall, etc., will all show a structure which can be compared to some stage of uterine endometrium. There will be desquamation of the epithelium, hemorrhage, old blood, hemosiderin in the stroma, all necessary to resemble true endometrium. Below is one typical case given in brief:

No. 40 W. S. 250597. Age, 34 years. Single. Patient was very well until two months ago when she became aware of a sense of pressure in the suprapubic region and right lower quadrant. There were frequent sensations of pressure in the bladder and rectum with a desire to move the bowels or void. There was increasing dull ache during menstruation and just after. The patient had severe constipation, obstipation and nausea. Her periods are always regular but the amount of flow is increasing. Examination in the hospital showed a tender mass in the right lower quadrant. Pelvic examination was unsatisfactory as patient was unmarried. By rectum a mass the size of a grapefruit was felt in the pelvis. Proctoscopy revealed a rough anterior rectal wall. At operation two large cysts were found, one in each ovary; the right was 10 cm. in diameter, somewhat irregular in shape. The left was symmetrical and two cm. in diameter. The cysts extended down into the posterior cul-de-sac and were adherent to the broad ligaments, posterior wall of uterus and rectum. A spotting of old blood was noticed throughout the pelvis, particularly anterior to the uterus. The omentum was flecked with brown spots varying from one to two mm. in size. This suggested blood pigment. The cysts were shelled out of the ovaries, rupturing during the process. The cysts contained thick brownish fluid similar to retained menstrual discharge seen in hematometra. The cysts arose from the inner and posterior aspect of the ovary. The omentum was adherent to the caecum.

Comment—The history and the findings at operation are typical of the advanced "chocolate cyst." The operator chose to remove the cyst or apparently could do so easily. The patient was young, unmarried, and although a cure could not be guaranteed because of the presence of the ovaries it seemed to be wiser to take the chance of recurrence than to sterilize the patient. Pathological examination,—"Two cysts from both ovaries which have already been opened and contents evacuated. They must have been about the size of a plum and are lined with a shaggy dark brown membrane and have fibrous walls of various degrees of thickness. Microscopically the large cysts are lined with pigmented wandering cells with hemorrhagic infiltration. Ovarian stroma forms their walls. In it there are scattered small cysts which are lined by gland tubules and stromal cells resembling endometrium. No evidence of endometrial lining can be found in the large cysts." This is the usual picture of the so-called "chocolate cyst" of the ovary. They can be included under the head of adenomyomata as they are made up of tissue resembling endometrium.

Adenomyoma of the Recto-Vaginal Septum

The adenomyoma of the recto-vaginal septum, of which there are three in this series, starts as a small tumor just behind the posterior lip of the cervix. It grows expansively and infiltrates the septum between the vagina and the rectum. It can be recognized by its position, its irregularity and its invasion and it seems to belong to both the vagina and the rectum. The patient usually comes to the clinic complaining of increasing constipation, menorrhagia or pelvic pain. The last case, seen in 1925, complained of pressure in the rectum, of constipation between periods and diarrhoea during periods with a constant desire to defecate. Various methods of treatment have been advocated and in three cases in this clinic three different methods were used.

In the first case the tumor was removed through a Kraske operation and an end-to-end suture of the rectum accomplished. In the second case part of the tumor was removed from the recto-vaginal septum below and then through the abdomen three inches of the rectal wall was excised. In the third case a remaining ovary was removed in the hope that atrophy of the tumor would occur. In a subsequent paper these three cases and their results will be taken up in detail. Suffice it to say that if removal of the ovary causes atrophy of the tumor how much better that operation than that of excision of intestine with suture.

Adenomyoma of the Tubal Wall

There were six cases of adenomyoma in the tubal wall, not classed as adenomyoma of the uterine cornua. In one case there was a small cyst on the peritoneal covering of the tube, in another a bean-sized nodule in the middle third of the tube, two were in the wall of the tube and another made up a large tumor of the tube. The latter was diagnosed as extra uterine pregnancy before and at operation but microscopical examination of the tissue showed typical adenomyoma. In one of these cases the tube was adherent to the abdominal wall subsequent to a previous operation and for some months after the first operation the patient oozed menstrual blood through a sinus in the abdominal wall.

The symptomatology and physical findings were not distinctive.

Adenomyoma of the Appendix

In one case adenomyoma of the appendix was found. This case was operated on for acute appendicitis and at operation the abdomen was found to be filled with thick bloody fluid. The right lower quadrant was a mass of fresh adhesions, the small intestine, colon and appendix were described as "inflamed." The appendix was bound down in a dense cake of adhesions. It was removed and two wicks placed in the abdomen. This patient later developed a subdiaphragmatic abscess which ruptured spontaneously. The pathologist reports as follows:—"Chronic inflammation of appendix with tumor. The tumor is three-fourths of an inch in diameter and is composed of smooth muscle and contains tissue in which are islands of endometrial-like tissue." It is probable that the blood in the abdomen came from a ruptured "chocolate cyst." It is also possible that the tumor of the appendix came from the ovarian cyst by direct extension or by implantation at some previous time.

Adenomyoma of the Round Ligament

There were two cases of adenomyoma of the round ligament. These were found in the region of the external inguinal ring and in both cases operation was advised for repair of inguinal hernia. The history of one of these cases shows that the patient noticed a tumor in the right groin, which was not painful. The lump gradually increasing in size. It had never been inflamed or never really painful. The pathological examination shows a slightly spherical tumor 4 cm. in diameter, showing on section a moist fibrous surface containing a number of bluish cysts. Microscopically there are bundles of smooth muscle whose fibers are separated by fluid and containing islands of endometrial-like tissue made up of gland tubules and a stroma of small round cells. Sampson[5] believes that adenomyoma of this type is probably an extension from a similar structure in the pelvis. He believes that like cancer this tumor may metastasize through a vessel or a vein and then lodge in the round ligament in the groin.

A tumor in the round ligament at the external inguinal ring might also be explained by a embryonic rest.

If an inguinal hernia was present this also might explain its presence as suggested by Sampson.[5] In these two cases in this series no hernia was found at operation.

The etiology of adenomyomata in this region has not been definitely established as yet.

Adenomyoma of a Gland

There was one case of adenomyoma of a gland from the mesentery in a case of cancer of the cervix. The pathologist's report is as follows:—"A nodule the size of a pea. Microscopically a structure with fibrous walls in places containing bundles of smooth muscle fibers and in the center an area of round cells in which are small, round, irregular, tubular glands." This slide was seen again and was identical with adenomyoma in any other region.

Peritoneal Implants

There were three cases of small implants in the peritoneum, two with dark pigmented stains of the omentum, one with implants about the ileo-cecal valve and two with implants on the rectum. None of these were examined microscopically, so that although the gross description was very suggestive they cannot be positively identified as adenomyoma. But because of the great probability they are included in the list of regions where adenomyoma is found.

STATISTICS

There were ten cases with multiple tumors. In one case the adenomyoma was found in the uterus (diffuse type), tube, ovaries and region of the ileo-cecal valve and peritoneum; another case showed tumor in the tube, one ovary, peritoneum and omentum. In five cases the adenomyoma was diffuse and it was also found in a discrete fibroid. One case showed the tumor in the ovary and appendix, another in both cornua and both ovaries, still another in one ovary and in the omentum. There is a considerable percentage of cases in which this type of tumor is found to be multiple. Seventeen cases had been previously operated upon and most of the operations had been done for relief of some pelvic condition other than adenomyoma. Nine of the cases had a dilatation and curettage for uterine bleeding.

The complaints tabulated showed thirty complaining of menorrhagia, sixteen of pelvic pain, four of constipation, four of back ache, three of tumor, two of dysmenorrhea and two of foul bloody discharge and one with frequency of urination.

The age incidence showed that nineteen were in the fourth decade, fourteen in the third, five in the fifth, two in the sixth and two in the second.

Thirty-seven were married, four were single, thirty-four had had children and three had had abortions with no living children.

These forty-two cases were all that could be found in the records of the Massachusetts General Hospital and many of them were not named adenomyoma in the Hospital records, but the diagnosis suggested some similar pathology. The slides of these cases were looked up and the diagnosis made upon re-examination. The mistakes in nomenclature were due to the fact that the tumors were not well known early as they are at this date.

Adenomyoma is a tumor that invades and does not metastasize. It is slow growing, may cause severe illness and death. Removal of the ovarian tissue probably causes atrophy of the adenomyomatous tissue as it does of the uterine endometrium. The menopause does the same thing. It is dependent upon the ovaries for its growth and fills with menstrual blood at each menstruation. The tumor will grow if scattered, as will endometrium. This has been proven experimentally and in a previous article[7] two cases were described, one an adenomyoma in the scar of a Cesarean section and another in the abdominal wall, following myomectomy. In some cases of late "chocolate cyst" the pelvis may be a mass of adhesions and old blood. Its appearance is as though some one had thrown mud into the pelvis. The diagnosis is not easy to make before operation but it should be borne in mind in pelvic cases with tumor and bleeding.

MORTALITY

There were five deaths as follows: No. 36 E. S. 330649—Patient died of shock following operation for cancer of cervix. In this case the adenomyoma was in sub-serous fibroid on the back of the uterus.

No. 17 III Surgical 252475—The patient died of general peritonitis following "atypical" supravaginal hysterectomy with removal of tubes and ovaries. The uterus was found in a mass of adhesions. The adenomyoma was of diffuse uterine type. Probably "chocolate cyst."

No. 10 E. S. 162508—Died of general peritonitis following supravaginal hysterectomy with removal of both tubes and ovaries. The tumor was of a diffuse type and appeared on section to grow from the peritoneal side of the the uterus rather than from the endometrial side.

No. 9 W. S. 261848—Large pelvic tumor with many adhesions. Both ovaries and tubes involved in masses of tough adhesions. The left tube and ovary were removed. Patient died of general septicemia. Adenomyoma of diffuse uterine type.

No. 3 E. S. 249253—Masses of adhesions, tubes, ovaries, ileo-caecal valve, pelvic peritoneum involved. Supravaginal hysterectomy with removal of both tubes and ovaries. The adenomyoma was found to be in the tubes, uterus and ovaries and the uterine adenomyoma appeared to grow from the peritoneal side rather than that of the endometrium. The patient developed intestinal obstruction one week after operation and died from operation for relief of obstruction.

A mortality of 11.9% demonstrates the seriousness of this lesion and of its relief.

SUMMARY

1. These tumors are made up of endometrial-like tissue and occur in numerous regions. The pelvic organs and their adjacent structures are most commonly affected.

2. They may become serious by invading and enlarging, causing intestinal obstruction and later death.

3. The "chocolate cyst" of Sampson is the most serious type. It may be responsible for the adenomyoma found in various organs.

4. Surgical removal of the adenomyoma itself is all that is necessary in some cases. In many with extensive pelvic pathology removal of the tumor and especially the ovaries is essential.

5. It is probable that removal of the ovaries causes atrophy and cessation of growth of adenomyomatous structures.

6. The diagnosis is difficult, but must always be thought of in diagnosing conditions of the female pelvis.

7. A mortality of 11.9% occurred in this series of forty-two cases.

8. The lesions are often multiple.

9. Menorrhagia was the outstanding symptom, being present in thirty cases.

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BRONCHIAL ASTHMA

The Role Played by House Dust and by Bacteria

BY FRANCIS M. RACKEMANN, M.D.* AND DONALD S. KING, M.D.*

THE exciting cause of asthma is either "extrinsic" operating from outside the body or "intrinsic" from some abnormality and presumably a focus of bacterial activity within the body. The proportion of cases in which the cause is extrinsic or intrinsic varies widely in reports from different clinics depending upon the methods of testing; upon the materials used and especially upon the interpretation of the tests. It is ordinary house dust first described

*From the Out-Patient Department of the Massachusetts General Hospital. Read before the Association of American Physicians in May, 1926.

by Cooke in 1922[1] as a cause of asthma and the interpretation of the results following intradermal injection of extracts made from it, which has caused the chief discrepancies.

The possible importance of house dust is shown first by the fact that in certain patients, asthma is worse in particular houses; and second by the fact that positive immediate local reactions following intradermal injections of house dust extracts occur in thirty six percent of all asthmatics, while no test has been obtained in a series of at least one hundred normal persons nor in over one hundred non-sensitive asthmatics.

In many of these same dust-sensitive patients, as well as in many of the non-sensitive patients, the circumstances under which attacks of asthma occur suggest a different interpretation of their cause. Asthma is prone to follow colds. Many patients have no asthma in summer but with some regularity develop a fresh series of attacks with the onset of cold weather in the fall. It is important that this onset is ordinarily not associated with any change in environment, occupation or dietary, which might suggest an extrinsic factor. Circumstantial evidence suggests a "bacterial asthma" but the situation is complicated by the fact that many of these same cases often show a positive skin reaction to extracts of house dust and often to other substances like horse dander as well.

In order to explain the findings, there are two theories. First that the primary factor is a hypersensitiveness to house dust; that the degree of this hypersensitiveness is not high, and that ordinarily the dust factor causes no symptoms but that the presence of any respiratory infection affects the portal of entry and allows the dust to become absorbed.

The second theory is that bacteria alone are responsible; that a true hypersensitiveness to some substance in the bacteria or to some product of their growth in the body, causes the trouble and that in this case, the skin reactions to dusts are unimportant.

Let us analyze the evidence for the dust theory.

Extracts of house dust obtained from the carpet sweeper or from the vacuum cleaner are made with Coca's fluid[2]. Such extracts are obviously complex mixtures. When injected intradermally, the resulting local reactions appear in fifteen minutes as areas of redness and swelling, but a typical urticarial wheal with its pseudopodia so commonly seen with positive tests to pollens or danders is not the rule, and the interpretation of these atypical reactions is difficult.

When these same extracts are used in a series of subcutaneous injections as treatment, the results in our hands have been disappointing, particularly in view of the optimistic reports of Cooke[3].

At the Massachusetts General Hospital, a total of ninety-five cases have been treated with dust extracts during the past three years. Moreover nineteen of these were treated with an "autogenous" dust extract made from the contents of the carpet sweeper in their particular house. Of these ninety-five cases fifteen were definitely improved at the end of treatment and in at least six cases, the improvement has persisted for several months after the last dose. Among the fifteen good results is only one of the nineteen "autogenous" cases and only five cases whose asthma was definitely associated with a particular environment.

Whether this improvement depends upon the dust injections cannot be verified, since in all but four of the fifteen cases some other material, ordinarily a vaccine, was used in treatment in addition to the dust extracts and at the same time, but the doses were always given separately and one would hardly expect any "other treatment" to interfere with an otherwise good result. Moreover ten of the fifteen cases gave a skin reaction to some substance in addition to the dust test. Indeed, at least two-thirds of the ninety-five dust cases reacted to other substances as well, which in half the cases were animal danders and (or) feathers. The details are:

Twenty-four cases reacted to dust and animals; 13 to dust, animals and pollen; 4 to dust, animals and orris; 4 to dust, animals and wheat; 4 to dust, animals, orris and pollen; 10 to dust and pollen; 2 to dust and wheat; 2 to dust and orris; 27 cases reacted to house dust alone, and finally five cases which gave no skin test to dust were nevertheless treated with house dust extracts because of the history of attacks occurring under certain definite circumstances and environments.

In any plan of treatment, the size and number of doses is important. Since in our earlier work, our extracts were standardized by total nitrogen, it may well be that our reluctance to administer doses with large nitrogen content explains our poor results, but more recently as suggested by Coca[2], the removal of some of this total nitrogen by dialysis and the use of the contents of the bag without dilution has not helped us. Local reactions following subcutaneous doses of these strong extracts have been small on the average, but red swollen areas measuring three or four inches in diameter and appearing in twenty-four hours, have been seen. Of the fifteen patients who were benefited by treatment, the local reactions were on the average large in five patients; moderate in two and small in eight so that in contrast to the observations with vaccines in asthma[4], good results with dust extracts do not appear to be dependent upon the degree of local reaction.

The so-called desensitization treatment of asthma is specific since a series of injections of

a substance to which the patient reacts by skin test is followed by relief from asthma, only in case that substance is the actual cause of the asthma. For example, if the symptoms depend upon a hypersensitiveness to cats, treatment with horse hair extract will have no effect, whereas treatment with cat hair will give gratifying results; and in hay fever we have observed that treatment in one year with Timothy pollen extract was unsatisfactory, while treatment in the next year with Red Top pollen extract was very satisfactory.

Although we have in many instances used a number of different dust extracts in the treatment of the same patient, we could not observe any better results with one extract than with another and it is our opinion that the poor results depend upon the fact that the extracts used do not represent the actual substance to which the patient is hypersensitive.

A third factor which tends to discredit the importance of dusts is that general reactions with urticaria and perhaps with asthma, which are so easily produced with extracts of pollen or of animal danders, have in our clinic not occurred following large doses of dust extracts in those patients who gave a skin test to them.

In summary then, we would call attention to the infrequency of typical tests; to the poor results in treatment in spite of varying dosages and the use of a number of different dust extracts and to the lack of any general reactions, as evidence that a hypersensitiveness to dust is in most of the cases, more apparent than real. We are well aware, however, that further study of such materials as moulds and other single substances as ingredients of house dust may lead to different conclusions.

The second theory of the exciting cause of asthma depends upon the demonstration of a hypersensitiveness to bacteria. Previous studies of local reactions to bacteria and their products, by many workers both on man and animals, have dealt with "late" reactions of the tuberculin type which appear in twenty-four hours and are inflammatory in character. In 1920 one of us[5] in describing skin tests with washed suspensions of dead bacteria in carbolised saline reported not only late inflammatory reactions but also "positive early tests to consist of an urticarial wheal surrounded by erythema much like the usual tests to pollens." A photograph of one of these immediate reactions has been preserved and substantiates this early report. However since 1920, we have watched for other immediate reactions to vaccines but without success. It is true that doses will at times produce a pale swelling surrounded by erythema, but when the patient's skin be very irritable, this swelling is not ordinarily "like the usual tests to pollens". More recent experience shows that an early reaction is rare and that the late inflammatory reaction is the rule. Studies by Zinsser[6], on the correlation of this late skin reaction with the immediate anaphylactic response in guinea pigs have shown that the two types of reaction are different, both in the manner of the preliminary treatment of the animal and also in the material used later to elicit the particular test.

Thus, guinea pigs prepared by a series of injections of bacterial extracts will on further treatment show a definite uterine strip reaction but usually not a skin test. This latter evidently depends upon a definite reaction in the animal body, for animals prepared with materials which do not produce such a reaction do not with further treatment, give a skin test.

The elicitation of bacterial skin tests of the "late" type in animals is a function of the nucleoprotein fraction—that is, of the substance which can be precipitated by acetic acid from alkaline extracts of whole bacteria. Skin tests ("late") can be elicited with filtrates of broth cultures. They are similar in character, and, as Zinsser and Grinnell[7] have shown for streptococci, occur in animals prepared by filtrates or better in these prepared by whole living bacteria.

In spite of the fact that all these are late (twenty-four hour) inflammatory reactions, it was hoped that by working with a number of different preparations, immediate reactions analogous to those with pollen or dander and like the early photograph might possibly be elicited in certain patients.

For this purpose stock cultures of bacteria of three types commonly found in asthmatic sputum, namely:

Staphylococcus Aureus
Hemolytic Streptococcus
Green Producing Streptococcus

were treated as follows:

First, the twenty-four hour growth in dextrose broth was centrifuged and the supernatant fluid was passed through a Berkefeld filter. This broth filtrate was saved.

Second, the bacterial sediment was allowed to stand for three days in a solution of N/100 NaOH in salt solution with occasional shaking, after which the supernatant fluid was passed through a Berkefeld filter. The addition of dilute hydrochloric acid to this clear extract did produce in the case of each organism a very definite grayish precipitate which was readily separated, washed with dilute acid saline and taken up in alkaline saline to constitute an "extract".

Third, the bacterial sediment remaining after extraction was suspended in carbolised saline, killed by heat at 56 C and preserved as a "vaccine".

Intradermal skin tests with filtrates, extracts and vaccines of these three stock organisms

were then made on six normal individuals and on twenty-one asthmatics. In each case all nine tests were made at one sitting. All the results were essentially negative. In the case of certain normals, as well as of certain asthmatics some of the reactions both in fifteen minutes and in twenty-four hours, were different than others, but in no case were any typical immediate urticarial wheals, either to filtrates, extracts or to vaccines, observed.

A second series of tests with similar materials freshly made up but of other strains of the same organisms, were likewise negative or at least not positive in six asthmatics. Finally in three cases, filtrates, extracts and vaccines were prepared from three organisms in each of the three sputa. Even with this autogenous material no immediate reactions were obtained. It may be said, however, that occasionally an elevated reddish area would develop in fifteen minutes and commonly to the stock staphylococcus filtrate and that a similar pseudo-reaction to the stock staphylococcus extract would often occur in the same patient.

The occurrence of any late reaction in the form of small reddish tender areas appearing in twenty-four hours was not found to bear any relation to the indefinite immediate reactions observed. This study is still in progress. So far, however, we cannot demonstrate that there is a hypersensitiveness to bacteria common in its mechanism to the usual hypersensitiveness to pollen or to animal dander.

DISCUSSION

It is evidently not possible to define the role played in asthma either by house dusts or by bacteria. Certain clinical observations are not without importance.

Extrinsic asthma is in the early stage of the attack independent of any bacterial effect. Attacks following exposure to horses or cats for example are clear cut and brief unless a secondary respiratory infection complicates the picture. Of our dust cases about one third give a history of asthma in some particular house and they might be regarded as cases of pure extrinsic asthma, except for the fact that treatment with dust extracts often made from the particular offending house has not helped them. This may of course be explained by the complex nature of our "house dust" extracts. But in other cases our diagnosis of dust asthma has depended not upon such a history but upon a positive skin reaction to one or other stock dust extracts, and many of these less typical cases begin their attacks with a cold.

The isolated respiratory infections so common in the early winter in New England lead to an attack of asthma only in certain individuals. When asthma accompanies bronchitis in these patients some other factor must exist and many patients in this group are found to be hypersensitive to some foreign substance like pollen, animal dander or perhaps house dust. The direct importance of the particular foreign substance is however not often clear since in most cases no change in the environment or occupation occurred immediately before the attack. The patient may be sensitive to horse dander and yet not have seen a horse for months. However another patient with a dog and with a slight skin reaction to dog hair extract may be identified as so slightly sensitive to her dog that she has no trouble except in the presence of a respiratory infection. It is not unreasonable to regard many of our dust cases in this same way: that the degree of sensitiveness is slight and must be activated. Here again, it is surprising that treatment with dust extracts has not accomplished more.

That so many cases of bacterial asthma do not give a positive skin test to any foreign substance, whether house dust or any other, makes it seem at least probable that the role played by foreign substances is not always an essential one. It occurs to us that many of the indefinite skin reactions which we see, point to some unknown characteristic of the asthmatic patient, rather than to a specific hypersensitiveness which is clinically important. The diagnosis of a "bacterial asthma" often seems adequate. Whether the mechanism of bacterial asthma of a pure type can be demonstrated is a problem demanding further study.

SUMMARY

1. The varying interpretations of skin reactions to house dust extracts account for the variation in the percentage of extrinsic asthma as reported from different clinics.

2. Thirty-six percent of all asthmatics show a skin reaction positive in some degree to house dust, but

3. Circumstantial evidence often points to a respiratory infection rather than exposure to dust as a cause of the attack.

4. Treatment of ninety-five asthmatics with dust extracts has produced good results in only fifteen and some of these had other treatment at the same time.

5. In spite of large doses of strong extracts general reactions with urticaria and asthma following treatment with dusts have not been seen in our clinic.

6. Studies of skin reaction to broth filtrates, to extracts and to vaccines made from three common sputum organisms in an attempt to demonstrate a hypersensitiveness to bacteria have so far failed, but this study is still in progress.

7. A diagnosis of "bacterial asthma" is clinically adequate. Indefinite skin tests may represent some unknown characteristic of the asthmatic patient rather than a specific hypersensitiveness which is clinically important.

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ANGINA PECTORIS AS A COMPLICATION IN MYXEDEMA AND EXOPHTHALMIC GOITER*

BY CYRUS C. STURGIS, M.D.

In studying a series of patients with diseases of the thyroid gland at the Peter Bent Brigham Hospital over a period of nine years, a small group was encountered in whom the syndrome of Angina Pectoris was present as a complication. It was of interest to note that this condition may occur in exophthalmic goiter, which is commonly attributed to an increased or altered secretion of the thyroid gland and also in myxedema, which very definitely results from a thyroid deficiency. The occurrence of angina pectoris in these two diseases with such fundamentally different causes, suggests the initial conclusion that the relationship between the diseases of the thyroid gland and the cardiac complaint is only a casual one. Our experience indicates, however, that this is not true, for a consideration of the physiological pathology of exophthalmic goiter and myxedema suggests abnormal conditions in each disease which may have some bearing on the occurrence of angina pectoris as a complication. Furthermore, the presence of such a serious cardiac complication either in myxedema or exophthalmic goiter influences the prognosis and calls for special care in the management of such patients.

The following case history illustrates the presence of attacks of angina pectoris in a patient with exophthalmic goiter and the relief of both conditions by appropriate surgical treatment of the thyroid gland:

E. M. Med. No. 19873, age 55, widow, was seen as an ambulatory patient on November 1, 1922, with a chief complaint of "heart trouble." The patient stated that eleven years before she had experienced palpitation at night on retiring and also suffered slightly from shortness of breath. She considered herself in excellent condition, however, until six years later when she first observed slight exophthalmos, which since then has varied considerably. At about this same time she experienced her first attack of angina pectoris when she was awakened during the night by a grinding, boring pain beneath the lower end of the sternum which was associated with numbness and tingling extending down both arms. Complete relief immediately followed the administration of nitroglycerine tablets under the tongue. Since the onset the patient has had innumerable attacks of a similar nature. An indication of the frequency of the anginal attacks is gained by the number of nitroglycerine tablets which have been taken for relief over the five-year period. She asserted that the drug was purchased by the bottle containing a thousand tablets and that 10,000 tablets had been taken for attacks of the anginal pain since its initial appearance. During the course of one night as many as twenty-five tablets have been required. Eight months before admission she had been obliged to give up her work as a "counter" in a paper mill on account of the attacks of substernal pain, and since then had been confined to bed at intervals of two or three days as a result of her cardiac complaint. In November, 1922, she observed that her neck was enlarged, and in the last five years there had been a loss of fifty-two pounds despite a good appetite. Other classical symptoms of exophthalmic goiter were prominent, such as increased irritability, emotional instability, increased warmth and sweating and tremor of the fingers. Physical examination showed an exceedingly nervous woman, with definite exophthalmos, a moderately enlarged thyroid gland, an enlarged heart with a loud systolic murmur heard over the entire precordium and a systolic blood pressure of 205 mm. and diastolic of 95 mm. Her initial basal metabolism was +34, and a few days later it had increased to +47. Operative treatment of the thyroid gland was advised and on December 5, 1922, the right superior thyroid artery was ligated by Dr. David Cheever. Ten days later a subtotal thyroidectomy was performed. Following both operative procedures, there was an increase in the number and intensity of the anginal attacks, but immediate relief was afforded by nitroglycerine. Otherwise her convalescence was uneventful and she left the hospital on January 1, 1923, in good condition and free from attacks of substernal pain. Her condition was followed for about two years and the result was entirely satisfactory as she returned to work and no longer suffered from her cardiac complaints.

The relation of the angina pectoris to exophthalmic goiter in this patient is obvious. With an elevated basal metabolism an increased load was imposed on the heart even with the patient at complete rest. When walking slowly the demand on the heart of such a patient is equivalent to much more strenuous exertion in a person with a normal metabolism. As a result of the constant strain on this patient's myocardium, cardiac pain appeared at such frequent intervals that an enormous number of doses of nitroglycerine was required for relief. It is probably true also that the mental status of a patient with exophthalmic goiter is of importance in relation to the cardiac seizures, as they are constantly restless, irritable, and easily upset by minor incidents which would make but a slight impression on the average normal person. If emotional states such as ex-

*From the Medical Clinic of the Peter Bent Brigham Hospital, Boston, Mass.

citement or anger are responsible for the precipitation of anginal attacks, it is to be expected that the frequence of the paroxysms would be great in a patient with exophthalmic goiter. Following the satisfactory treatment of the thyroid condition in this patient, with a resultant fall in the basal metabolism and associated diminished demand on the heart, she was able to return to her work with complete relief from cardiac symptoms.

An interesting corollary from the above history is to be found in the following patient, who probably increased his basal metabolism, and, therefore, the demands on his myocardium, by the use of thyroid gland by mouth.

The patient was a middle-aged business man, who had always led an active life physically and mentally. He was first seen on January 16, 1924, with the chief complaint of "attacks of irregular heart." He had no complaints except that for about a month he had noticed transient attacks of cardiac irregularity. No other symptoms were present. He volunteered the information, however, that for two years he had taken six grains of dried thyroid gland for three or four days a week and then omitted it for ten days or two weeks. He did this on his own initiative in order to reduce in body weight. The total dosage of thyroid gland is difficult to estimate, but enough was consumed to result in the loss of three or four pounds of body weight following each course of treatment. On physical examination no abnormalities were found except an occasional extrasystole was noted and this was confirmed by an electrocardiogram. The patient was advised to discontinue the thyroid medication and reduce his body weight by dietary means, but this he refused to do and declared he would continue as before. No further information was obtained concerning him until he died suddenly while walking along the street, about one year later. It was not known if this patient had continued with the thyroid medication, but the inference was that he had. Nor is it known if he had developed attacks of substernal pain or oppression in the interim.

The point I wish to emphasize is that thyroid gland should not be administered indiscriminately, especially in middle aged or elderly patients, as it may place a constant strain on the myocardium which corresponds to moderate exertion, and serious consequences may follow if the heart can not meet the increased demands.

The records of the following two patients give our experience in the treatment of myxedema when angina pectoris is present as a complication. Both patients had characteristic attacks of severe substernal pain which was relieved by tablets of nitroglycerine. Also, in both instances the myxedema was moderately advanced and was associated with a definite anemia.

M. H. B., age 50, female, Med. No. 25,374, admitted February 19, 1925, complaining of "pain in the chest." The family history and past history were irrelevant. In general she had been strong and healthy until about four years before admission when she observed mild attacks of pain in the anterior part of the chest. The patient regarded this symptom as insignificant until a year before entrance, when the attacks increased in frequency and intensity. She described them as severe and constricting in character, and radiating from the region of the heart to between the scapulae and down the right arm. The attacks were induced by mild exertion such as light housework or walking and were promptly relieved by rest and "small white pills" which had been given to her by her physician. Ten months before admission her condition became very much worse as the attacks of pain followed even the slightest exertion and also marked dyspnea developed. As a result of these symptoms almost complete bed care became necessary. In addition to the above symptoms the patient gave a history suggesting myxedema, for she had had complaints such as susceptibility to cold, impaired memory, and absence of sweating. Her face showed changes characteristic of the disease, the speech was slow and thick, there was a loss of hair over the body, and the skin had a slightly yellowish tint and was thick and dry. The left border of cardiac dullness measured 9.5 cm. and the right border 3.5 cm. from the mid-sternal line. The heart rate was slow, rhythm regular, and cardiac sounds were tic-tac but otherwise normal. No murmurs were heard. The blood pressure was 135 systolic and 110 diastolic. The physical examination otherwise revealed nothing of importance. Examination of the blood showed a definite anemia as the red blood count was 2,000,000 per cubic millimeter and the hemoglobin was 45 per cent. The basal metabolism was —32. In summary, the patient gave a definite history of angina pectoris and when admitted to the hospital was found to have cardiac insufficiency and myxedema.

The patient was kept at complete rest in bed and given dried thyroid gland 0.13 grams four times a day. A few days later she became more alert mentally and appeared to be much improved. On the fourth day of the treatment, however, the pulse rate increased to 120 a minute, whereas it had previously been in the vicinity of 85 a minute, the heart sounds were faint, the pulse thready, and the patient appeared pale and weak. The thyroid medication was discontinued as it was thought that the load had been excessive on the heart. Eleven days later the metabolism was found to be —6. At this time the cardiac condition had improved and the patient was given two doses of dried thyroid gland, each of 0.065 grams. Four days later the drug was given in doses of 0.065 grams for four doses. The day before the last dose was administered she complained of loss of appetite and vomited following her evening meal. The following day she seemed to be in good condition but suddenly became pulseless and died. At necropsy the heart was found to weigh 456 grams and appeared to have a fairly uniform enlargement. The coronary arteries were easily felt, were tortuous and rather firm. In places definite calcified plaques were felt along their course. The aorta showed numerous atheromatous areas. Throughout the myocardium large areas of muscle fibers were replaced by a loose connective tissue network and in some areas dense scar tisue was present. The isthmus and both lobes of the thyroid gland were very small and firm. Microscopic examination showed the number of functioning acini to be greatly diminished.

A. B. Real estate dealer, age 57, admitted on June 18, 1925, complaining of "pain in the chest."

The patient had always been strong and healthy and had no difficulty until one month before admission. At this time he observed a sense of pressure under the sternum after walking or during excitement and occasionally the sensation radiated to the left shoulder. With the substernal oppression there was a transient shortness of breath which rapidly disappeared on resting. A few weeks before admission the patient noticed for the first time that there was a decrease in hair on his arms, legs, in the

axillae and on his chest and back. His friends had remarked about his sallow color, slowness of speech and general demeanor. Physical examination showed the striking features of myxedema, including a dry, rough skin, supraclavicular fat pads, a diminished amount of hair of the body, bradycardia, and thick, slow speech. The heart was enlarged as indicated by an apex impulse which was 1 cm. outside the nipple line, 11 cm. to the left of the mid-sternal line. The heart action was slow and regular; the first sound was slightly diminished in intensity; no murmurs were heard. The peripheral arteries were moderately sclerosed. A seven-foot film of the heart showed a uniform and rather striking enlargement of all four chambers of the heart which has been regarded as characteristic of myxedema[1]. The basal metabolism on admission was —37. The vital capacity was 73 per cent of normal according to the standards of West[2]. Blood examination showed a moderately severe anemia as indicated by a red blood count of 3,264,000 and hemoglobin estimation of 53 per cent (Dare). The patient was placed at complete rest in bed and given thirteen doses of dried thyroid gland in amounts of .13 grams three times a day. At the end of this time his basal metabolism was found to be —16. As it was thought that he would be more comfortable with a metabolism at this level, he was given .13 grams daily, which is an average dose calculated to maintain the metabolism at the existing level. After six days the patient was disturbed for the first time since his admission to the hospital with attacks of substernal pain which occurred while lying quietly in bed. His metabolism at this time was found to be —7. On account of his cardiac complaints the thyroid therapy was discontinued for one week and at the end of this time all heart symptoms had disappeared and the metabolism had decreased to —23. He was then given a maintenance dose of 0.065 grams daily for ten days and was then found to have a metabolism of —17. He felt very much improved and did not suffer from cardiac pain when walking slowly about the ward. On July 23, the thirty-fifth day after admission, he was discharged and instructed to take 0.065 grams of dried thyroid gland daily. The patient returned to the Out-Door Department three times between July 23 and September 8, 1925. He reported an improvement in the symptoms due to myxedema, but the result had not been as good as one ordinarily expects, as the thyroid dosage had been inadequate on account of the cardiac condition. Even with this small dosage, the patient was frequently troubled with substernal pain on slight exertion. It was thought that better results might be obtained by placing him at complete rest in bed under observation in the hospital and attempt to improve the symptoms which were attributed to his myxedema. His chief complaints in this respect were swelling about the eyes and susceptibility to cold. Accordingly the patient was admitted for the second time to the hospital on September 14. During this admission it was decided to keep the patient at complete rest in bed and cautiously increase the amount of thyroid gland to be given until the metabolism had reached the vicinity of —10, or to ascertain the maximum dosage of thyroid gland which could be administered for the relief of the myxedema and not cause attacks of angina pectoris. The day following admission the patient's basal metabolism was —27. He was given 0.1 grams daily for sixteen consecutive days and at the end of this time his metabolism was found to be —24. As the metabolism had increased only slightly the thyroid was increased to 0.13 grams daily for seven days, but following this therapy the metabolism still did not increase, as the determination was —23. With an increase in the amount of thyroid gland to 0.16 grams daily for six additional days the metabolism was found to be —28. At this time, on October 15, after the patient had been receiving thyroid medication in increasing doses for thirty-one consecutive days, mild attacks of substernal pain occurred. As the attacks were not severe and were easily controlled with nitroglycerine, and as the patient's metabolism was low (—28) it was decided to increase the dosage of thyroid gland cautiously. For the next two days, therefore, the patient received thyroid gland in doses of 0.195 daily. At the end of this interval the attacks of angina were so frequent and intense that it was deemed wise to discontinue the drug. The day after this the metabolism was found to be —7. For the next twenty-three days all thyroid therapy was discontinued and the patient left the hospital on November 9, 1925. At this time he could walk at a moderate rate without discomfort, and did not once suffer from an attack of cardiac pain during the last twenty-three days in the hospital.

The patient was seen eight days later as an ambulatory patient. He had been going to his office but complained that he still experienced substernal pain on exertion. At this time it was observed that there was swelling about the eyes and other symptoms indicating a recurrence of myxedema. He was given .030 grams of dried thyroid gland once a day and this was gradually increased in a two months period to .030 grams three times a day. With this therapy his general condition improved strikingly and he had no complaints except occasional attacks of anginal pain on exertion. On January 17, 1926, the patient suddenly developed a severe attack of pain which persisted for four hours, and did not yield to nitroglycerine but was promptly relieved by morphine. All thyroid medication was discontinued for ten days, and at the end of that time 0.030 grams daily was given which has been continued up to the present, a period of four months. During this interval the patient has required nitroglycerine only four or five times and he has felt very well. All symptoms of myxedema have disappeared. While a dose of 0.030 grams of thyroid gland is a rather inadequate one in order to maintain a patient with myxedema in good condition, it was necessary in this patient to give such a small dose in order to avoid an undue strain on the heart, and after a period of several months a satisfactory improvement was noted in all of the symptoms of myxedema.

DISCUSSION

The occurrence of angina pectoris in patients with myxedema is of interest from at least two standpoints; first, as a complicating factor which it introduces into the treatment of the disease with thyroid gland; and second, the possibility that myxedema may be responsible in rare instances for some anatomical change which causes angina pectoris. Concerning the latter, it is interesting to note that in about half of the patients with myxedema necropsy findings indicate an extensive atheroma of the aorta and also an endarteritis of the smaller arteries all over the body. Fishberg[3] emphasizes that various anatomic, experimental and clinical findings indicate that a loss of thyroid secretion has among its consequences injury to the vascular system. This author reported an instance of a patient, 21 years of age, with hyperthyroidism, in whom necropsy showed marked atheromatous changes in the arch of the aorta and the larger branches of the coronary arteries. It has been noted in a majority of patients with myxedema who have been admitted to the Peter

Bent Brigham Hospital that an unusual amount of thickening is present in the peripheral arteries. In some instances these patients have been referred to the hospital with a diagnosis of generalized arteriosclerosis, and the obvious feature of myxedema have been over-looked. It appears plausible that myxedema may be associated with arteriosclerotic changes in both large and small arteries, and if this condition is a factor in the causation of angina pectoris, there may be a relationship between this disease and myxedema in some instance.

Of great practical importance is the method of administering thyroid gland in patients with myxedema and angina pectoris. Our experience has taught us that this drug should be given with the utmost caution, as it stimulates cellular metabolism which calls for an increased supply of oxygen for the body tissue. In order to transport this to the tissues from the lungs, it is necessary for the heart to perform more work in order to augment the amount of blood which is circulated. If there is a co-existing anemia, which is not infrequent, the capacity of the blood to carry oxygen is diminished and the circulatory rate must be increased still more. The sudden imposition of such a strain on the myocardium may result in serious symptoms and even death. All such patients should be given daily doses of thyroid gland which do not exceed 0.030 and they should be continued for months, provided no serious symptoms supervene. By this method the strain will be placed on the heart very gradually as an increase in the oxygen demands of the tissues and improvement in the patient's general condition proceeds with extreme slowness. If such patients are given dried thyroid gland in doses of 0.13 four times a day, in accordance with the usual dosage, and the therapy continued until the basal metabolism reaches normal limits, the possibility of resulting harm to the patient is great. It may require several months, however, if the patient is given a small daily dose of thyroid, to see improvement in the symptoms of myxedema, but it is the only safe procedure to follow.

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RURAL MEDICINE IN WORCESTER COUNTY: RETROSPECTIVE AND PROSPECTIVE*

BY FRANK H. WASHBURN, M.D., F.A.C.S.

Mr. President, Ladies and Gentlemen:

In his introductory remarks, the orator of this society for 1878, Dr. Leonard Wheeler, gave an interesting bit of history. He said that for years after the oration, or discourse as it was then called, of 1840, "the office lacked importance sufficient to impress the incumbent with any necessity of executing his trust, the orator sometimes neither preparing an address, presenting himself, or even sending an apology."

The present incumbent, following the subsidence of the mental inflation resulting from election, as so often may follow an election of most any kind in case of the inexperienced, found himself seriously considering the resurrection of the custom of that period. Upon deliberation the more honorable course of "seeing it through" has been adopted and rather than inviting your interest in our discourse, we ask your indulgence, hope for your patience and pray for a mutual sympathy.

It is our purpose to attempt to portray something of the "life and times" of certain characters in medicine, who practiced prior to the present century, in the domain of our society, mentioning a sufficient number of relative and interesting persons and events merely to illustrate the evolution of the present country practitioner of our district. Our objective is consideration of future rural medicine.

From the records found in the archives of the history of our society, much may be brought to light relative to activities and achievements of Worcester doctors of early days; some also bearing, in a general way, upon the medical residents of the whole district area; but we trust the urban members of the Worcester District Society will generously forgive the confining of our historical references to those pertaining to rural doctors and country medical conditions of former times, inasmuch as these seem to constitute the only integral subject heretofore neglected by orators.

Before, and for some period following, the advent of white people upon Worcester County soil, the Nipmuck and the Nasheway medicine men gave comfort and hope to the sick of their race, at least such was probably their intention. The medicine man was the predecessor of the country doctor. Literature of pre- and post-revolutionary periods, so far as we have perused it, gives no information regarding individuals among Indian practitioners living in this vicinity, but something of their crude methods and influence upon the superstitions of their people is mentioned.

The American savages, in common with other uncivilized peoples, believed in the daimonistic

*Annual Oration, read before the Worcester District Medical Society, May 12, 1926.

theory of sickness and death. They believed that these and certain other misfortunes were due to spirit possession. "Spencer has shown that nature man believes that during dreams, fainting fits, swoons, trance and like phenomena, the soul, or other self, is temporarily absent from the body, hence these unusual experiences." It is thus readily seen why the American Indian medicine man howled, made grimaces, and performed hideously before those under his treatment. He attempted to scare away the obnoxious spirits temporarily possessing the bodies of his patients. While Hippocrates taught that "no disease whatever came from the gods, but was in every instance traceable to a natural and intelligible cause" even civilized races have at times shown a persistence in retaining belief in the supernatural in the etiology of disease and we can therefore cease to wonder that the simple children of the forest believed in spirit possession.

That the mortality under this regime was tremendous seems axiomatic. In the seventh report of the Bureau of Ethnology it is stated that the medical practices of the Indians constituted the most effective factor in keeping the population down. Nevertheless, in specific instances, the savage practitioner probably produced favorable results. One can easily, in his fancy, follow a Nipmuck medicine man to a tepee, say in the village of Hassanimisco, now Grafton, on an errand of intended mercy. While his armamentarium included snake-skins, tomtoms and all sorts of fantastic appliances and his therapeutic methods included howls, grimaces and wierd dances, the Nipmuck medicine man also believed in the efficacy of drugs and whether they contained less or more intrinsic virtue than the shop made preparations of today, it seems likely that his simple roots and barks, with their accompanying suggestion, were just as potent for results as many of the modern literature accompanied polypharmaceuticals. Maddox remarks, "The present day theory of disease is that of invasion of the body by devils—that is adversaries—or germs of animal and vegetable rather than supernatural origin, not necessarily with any malicious intent, but driven by nature to seek for substance whereby to repair waste energy. Various ways of access to the usurped abode are utilized by these parasites—the water drunk, the food eaten, the air breathed and the probocides of insects. It remains for future generations to discover exactly how far on the road to truth the theory of the twentieth century has advanced beyond that of the savage."

While history leaves no doubt in one's mind as to the elevated status of the primitive shaman, in his tribe, our first researches into that of the Caucasian doctor, of colonial and post-revolutionary times was less reassuring. Thus—Whitney's History of Worcester County, published in 1793, mentions by name considerably over a hundred preachers, numerous justices, sheriffs and politicians, yet we were unable to find the name of a single medical practitioner mentioned. Nevertheless we read in the preface that the author "has not omitted anything worth preserving which has come to his knowledge."

In 1764 there came from Wrentham, to settle in Westboro, a young physician, Dr. Hawes, "who was destined to have a large influence in the town." He was described as "rather tall, plain looking, with his hair standing up straight from his forehead. He was the most prominent citizen of Westboro for many years. As a farmer, physician and lawyer he led a busy life. He was active in politics: for many years was town clerk; during the revolution was an active home worker, holding unflinchingly the very unpopular position of constable. He was deacon of the Congregational Church and one of the original founders of the Baptist Church. The historian says "He lived here nearly fifty years, all the time in the same house. He died with his honors thick upon him in 1821."

One of his memorandum books contains a long bill made out to one Benjamin Tantor. Among other items are these:

April & May 1777	
To medicine and attendance in Small-pox—	£5.14.3
To rum, suger, brandy, tee, molasses and sundry medicines and attendance—	£3.0.0

On the opposite page is "counter," as follows:

March 1772	
Received 8 vials—	0.1.2
By 6 barrels Cyder—	0.16.0
By carting 13 gallons of wine—	0.1.0
June 1777	
By house rent for inoculating etc.—	8.14.0

and many similar entries.

He opened his house freely to strangers and gave them probably as good accommodation as they would have had at the tavern, and charged something as follows:

To John Wesson of Brookfield, Dr.	
Mar. 12, 1793	
To 2 glasses of brandy	0.0.9
" a supper	0.1.2
" a lodging	0.0.6
" a glass of brandy	0.0.4-½
	0.3.1-½

His bills were often paid by barter—by hay, butter, cider, spinning, etc.

He often let his horse:

Dec. 10, 1766 for my horse to ride 3 miles—	3d.1qr.
Oct. 10, 1791 To my shays to Boston, 30 miles	6s.
June 10, 1809 To my horse to Hopkinton 6 miles—	17cts.

We found it difficult to desist copying these peculiar items which are indicative of the varied service rendered his community by Dr. Hawes.

History informs us that the original grant of Rutland, called Naquog, a tract of 12 sq. miles, comprised what is now Rutland, Oakham, Barre, Hubbardston and the greater part of Princeton and about half of Paxton and included in all about one eighth part of the present Worcester County. The deed, purchased in 1686, for a small sum from certain Indians who claimed to be lords of the soil, was recorded in Middlesex County in 1714.

Numerous epidemics marked the early medical history of Rutland, such as "canker rash" or throat distemper, "bloody-flux" and small-pox. In the early 19th century "spotted fever" and "putrid fever" visited the region, all of which scourges had a high mortality rate. The historian says of the small-pox visitation of 1759 and 60—"A soldier passed through the town from the army, who was not cleansed of the small pox, it being the Sabbath, his dog went into the meeting house and gave infection to several persons."

Two physicians, Dr. John Field, in 1815, and Dr. Jonah Howe, in 1825, came to death by drowning. Of the first is written "Dr. John Field was drowned in Cedar Swamp Pond, fishing with a companion, and like the two women grinding at the mill, he was taken and the other left."

The most notable early figure in medicine, in this town, appears to have been Dr. John Frink Esq., one of the original incorporators of the Massachusetts Medical Society. The historian says "He and his son of the same name, have, one or other, been in active practice of physic in this town upwards of 80 years."

It appears that in 1779, Dr. John Quin, surgeon of the private armed ship Sullivan, was detained a prisoner at Halifax and according to the General Court "was treated in a Cruel and unprecedented manner under pretense of his being a deserter from the British service." It was therefore ordered that the surgeon, William Goldson, of the British Sloop of War, that had been captured, "be committed to and detained in close prison until said Dr. John Quin be liberated." A resolve to this effect was passed Oct. 2, 1779. In 1780, the prison confinement having greatly impaired the health of Surgeon Goldson, the following interesting resolve was passed by the General Court.

"Whereas it has been represented to the Court that the health of William Goldson, late surgeon of the British Sloop of War, who was committed to the Gaol in Boston, in consequence of a Resolve of the General Court passed the second of October 1779 to retaliate the ill treatment of Dr. John Quin, detained a prisoner at Halifax, is much impaired, and by certificate of Dr. John Warren it appears that the free use of the air is absolutely necessary to the health of the said Goldson, therefore—

"Resolved: That the sheriff of the County of Suffolk be and hereby is directed to deliver the said William Goldson to Joshua Massereau, Deputy Commissioner of Prisoners, who is hereby ordered and directed to send him to the barracks in the town of Rutland."

Passed March 16, 1780. Chapter 811.

Mr. Louis M. Hanff, present Town Clerk of Rutland, to whom I am indebted for evidence of these facts, makes this pertinent comment: "When I came across this resolve, I thought it strange that, over one hundred years after this event, the state started the Sanatorium where many could get 'the free use of the air.' "

It may seem to you that I have dwelt unduly at length upon the early history of Rutland but my justification lies in the fact that, in the beginning of the 19th century, the early days of our society, Worcester was "but little more than a village" and of so little relative importance in the county that the semiannual meetings were held alternately at Reeds' tavern in Rutland and Daniel Haywoods' hostelry in Worcester." Apropos of this it is interesting to note that Whitneys' History, under caption —Worcester, states—It is become very populous, containing two thousand one hundred inhabitants according to the census of 1791; and it will no doubt still greatly increase for many years. It is also wealthy and opulent, being the third town in the county, in the proportion in which it pays in the state tax, and it would be the first, most certainly, in the list, did not the other two, Brookfield and Sutton, greatly exceed it in extent, and dimentions, and also in the number of fowls.

A notable character who practiced in Northboro for about 50 years, from about 1792 to 1842, was a Dr. Ball. The historian refers to him as "jolting around in his yellow topped gig, drawn by the 'Parmenter mare' with her head, back and tail all in a line, the star in her forehead bobbing slowly up and down, and her short tail and hind leg making spasmodic attempts to brush off the flies. The doctor sat in the gig, a short stout man, with a very short neck, wearing in winter a fur hat, much larger at the top than at the bottom, including even the inch wide brim, and in summer a plain straw painted drab. Even in these late days, when the canvas covered gig had superceeded the saddle, he still carried his medicines in his saddle bags, and it was a common remark that anyone passing Dr. Ball in the dark could recognize him by the odour of drugs exhaled from the old gig." Whatever the trouble, on visiting the sick, his programme was much the same; he first bled the arm, then gave a severe emetic, followed by doses of calomel and jalap. He had what he called his "recipe book" which contained many curious formulas. Several were "shot-gun" prescriptions of many ingredients. Of these he would remark—"If you are going to shoot a bird use plenty of shot. Some of these things will be pretty sure to hit the case."

Much could be written, that is interesting, of this eccentric practitioner, who represents a

type of his day, but time does not permit. We cannot refrain, however from reproducing the following portion of an article written by him on "Imagination":

"In an early part of my Practice I was called into a neighboring Town to Visit a Patient. It being about the middle of the day, the old gentleman of the house invited me to stop and dine with him. While at dinner he sayes I dont know as you like my dinner. Why yes said I, I doe like it very well. I guess said he you don't know what you are eating. Why yes said I, I doe. It is some new corned beefe. Ah said the old gentleman (he being over 60 years old) it is horse beefe. I replied I don't believe it. It is said he, I declare it is some of my old Mare. I was not much acquainted with him at that time. I looked at him supposing him to be joking, but could not discover a mustle of his face to change or alter. I had just taken another piece on my plate and a mouthful of the second slice in my mouth, and in fact it was horse flesh sure enough. I could taste it as plain as my olfactory nerves would discover the scent of an old horse. The more I chewed it the more disagreeable it tasted. I continued taking a little sauce in my mouth. I could swallow but the meat as the negro said was no go. I at last gave a swallow as I doe with a dose of Physick. I thought I should have thrown the whole contents of my stomach up at the table. I afterwards tasted a little sauce, but took care not to put any more meat in my mouth, and kept time with the family, and glad I was when dinner was over. It being cold weather the old gentleman turned to the fire and went to smoking and telling stories. At last the gentleman said I tell you what it is. I wont leave you in the dark about your dinner. I told you we had horse meat for dinner, and so it was for I swapped her away for a steere and that was some of the beefe. I have ever since been glad the incident occurred, for I should never have known how far imagination would carry me, had it not been for the Joke the old gentleman put upon me."

Dr. Ball continues with a description of the practical application, in his practice, of the lesson.

That our rural communities have produced men of brilliance in our profession, prior to the present century, is common knowledge and their names are familiar. We will mention one—Andrew Jackson Howe—Born in Paxton, 1825; died in Cincinnati, 1892. Paxton schools and Leicester Academy furnished his early education. He graduated at Harvard in 1853. After studying at various medical schools he took his degree at the old Worcester Medical Institution and became for a short time its Professor of Anatomy. He taught anatomy at the Cincinnati College of Medicine, after whch he became connected with the Eclectic Medical Institute as anatomist, but eventually filling the chair of surgery at the time that school was in its zenith. Dr. Howe, it seems evident, was a man of forceful personality, brilliant mind, literary genius and versatility. He had marked ability as a teacher, surgeon and gynaecologist and was a prolific writer, being the author of several books and essays on surgery and the sciences.

The enmity arising between the regular school of medicine and some of its mild deviations, such as the Eclectic school, during the previous century, probably prevented the name of Dr. Andrew Jackson Howe from becoming properly fixed in the medical history of our county, yet we think Paxton may well take pride in the production of such a son.

It is confessedly not without a touch of pleasure that the essayist has, from time to time, marveled at the numbers of world startling discoveries and pioneer procedures, in the realm of medicine, which were, either the product of cross roads doctors, or of country bred men. This fact is probably familiar to all and we will not consume time with their enumeration, except to recall that it was a Charlton boy who placed ether anaesthesia before the medical profession.

Oxford may take just pride in the production of Clara Barton, and while hers may not be intrinsically medical history, the American Red Cross and emergency medical war relief are so associated as to be inseparable in the mind of man.

But let us return to the old family doctor—

It was the privilege of the dissertator, in the first year of his practice in Worcester County, to come in frequent contact with Dr. John S. Ames, of Holden who typified the real family physician of the nineteenth century, and to minister to him in his last illness. Dr. Ames was among the last of "the old guard." His towering form is undoubtedly remembered by some of you, for he almost never missed a meeting of the Worcester District Medical Society. Whether fair weather or foul, he would hitch up old David in the Goddard, the electric car line then not having become available, drive to the city and attentively listen to the reading of papers, rarely if ever, because of modesty and self consciousness, taking part in the discussions. He had a scientific mind and seemed to know something of every scientific subject. He was eccentric, as seemed characteristic of most of the old country doctors. He had in his possession all parts of the microscope, numerous lenses and accessories, though they were misfits, but he fondled them as playthings. He subscribed for, to our personal knowledge, at least two purely microscopical journals, yet his widow informed me after his death, he never owned a complete, usable microscope. He felt that he could not afford it. He told me that during his forty-four years of practice in the town, he had visited professionally in every house there, with one exception. He possessed few medical books but he knew what was in them. When he died at 74, nearly the whole town turned out to attend his funeral, although it was a stormy day. The same thought seemed to be on the lips of all—"Our old doctor has gone."

A question retained on some of the life insurance blanks reads something like this—"Are you the applicant's family physician?" Who has not experienced embarrassment in replying? The real family physician, in the former com-

prehension, however we may regret the fact, has practically, passed. All will agree, we think, that the physician of today, in his relation to the family, is in a transitional state. The transition, undoubtedly, has its determining influence in our changing environment and the spirit of the age. The old time country doctor, rural practitioner, from colonial days to the beginning of the present century, lived under conditions vastly different than we are living. His armamentarium could well be carried in his saddle bags, his gig or his Stanhope buggy. No great libraries were available or necessary to him, nor were but the simplest laboratory procedures required in his practice. So far as medical practice was concerned, it seemed not necessary that he move about too rapidly to cover his day; in fact, often he was a protean public servant, taking up to absorb his energy other professions as well.

In the literature of the past year much space has been devoted to him. He was the theme of a special article in the *Journal of the A. M. A.* He was discussed, in beautiful language, by Dr. Cheever, in the Annual Discourse of the Massachusetts Medical Society. To quote one clause—"His memory is enshrined in the traditions of our New England country-side and the likeness of his personality and character are perpetuated in the literature of our people." The *A. M. A. Bulletin* of the House of Delegates seriously discussed the advisability of erecting a monument to perpetuate our memory of him, and in his presidential address Dr. Haggard eulogizes him.—And all this indicates change; a type is passing.

The statement is attributed to Archbishop Trench that "a man might fully be assumed to remember clearly and well for sixty years back, and that only five of these periods of sixty years would carry us back to the age of Spencer, the author of the "Faerie Queen," and not more than eight to the time of Chaucer. In that time the English language has been remade, yet any one of the imagined series of eight men would have denied that in his life time there had been any change worth mentioning."

This statement hardly holds good for the science of medicine—The changes of a single lifetimme have been so great—as examples, the introduction of anaesthesia, by Simpson and Morton; the substitution of the facts brought out by the experiments of Pasteur for the spontaneous generation theory; the development of antisepsis and asepsis, resulting from the work of Lister; the pioneer work in tuberculosis by Brehmer, Trudeau and Koch—to name but a few—that "new sciences have sprung into being and the medical man of today speaks a different language, even from his immediate predecessor."

In the past quarter of a century, important discoveries in medicine have come so fast that, although each may be no less important than some of those epoch making discoveries of the previous 300 years, they cannot be thus termed for their multiplicity and their coming in so swift succession hardly gives time to mark epochs, which usage has associated with considerable periods of time. In a general way we speak of this as the era of scientific discovery. The accumulation of knowledge has been so great that its effect upon medicine has been to increase its magnitude beyond the limitation of any one mind to grasp and assimilate, thus resulting, of necessity, in the development of specialties, and we are well into what has been termed the era of specialization. And specialization, we must admit has advanced the worth of our calling and is probably a large factor in the change of which we speak. Although up to the present specialization has been very limited among rural practitioners themselves, the effect upon the conditions of rural medicine has been far reaching.

There are so many other factors to be considered that time will permit the specific mention of only a few of the most important.—The development of the automobile, in its effect upon environment, is hardly less important in the metamorphosis, than medical inventions and discoveries and specialization. The adoption of higher standards of education, dropping the veil of mystery by means of public information, the contemporaneous appearance of certain cults, the growth of laboratories, the growing appreciation of the worth of hospitals and improvement in efficiency of the latter, the broader activities of the trained-nurse, the new sanitation, prophylaxis, public and personal hygiene, well baby conferences, periodical health examinations and shop and factory hygiene and medicine—all necessarily affect the conditions of village and country medicine.

While New England farming communities have shrunken in population, that of the villages has begun to increase. Better roads and easier commutation lead city workers to homes in the country. Many are realizing the truth of the adage "God made the country and man made the town." The "country heck" no longer exists outside the joke page and the vaudeville house and country people are demanding the same scientific treatment of their maladies as do urban dwellers.

In the recent past there has been a growing scarcity of country doctors. The problem of meeting the demand for competent medical care for the rural dweller is real. The reasons conceived for the failure of recent graduates to fill vacancies in the country districts are as numerous as the alleged remedial measures suggested.

Attention has been focussed, in the past few years, upon this matter, and a study was made of the problem by the Massachusetts Medical Society in 1923. The Department of Public

Health, under the direction of the Massachusetts Legislature, made a rather exhaustive study and the report of their committee provides food for serious thought. Without reviewing the various phases of the reports, we wish to say that to our mind two problems present themselves, or two phases of the same problem, that of supplying physicians to towns with no medical service, which, so far in Massachusetts, applies to a comparatively few towns; and that of furnishing high class medical service consistent with modern medical knowledge and which may affect a large proportion of rural Massachusetts. While all students of this subject recognize the commercial phase of the problem and recognize the apparent difficulty of supporting a physician at all in some small communities, we believe it is often overstressed. The paramount phase is that of inducing men, taught by specialists in the medical school and during their internships, in the use of instruments of precision, to attempt the struggle single handed and unarmed.

A proposition as a remedial measure that has been suggested, evidently in all seriousness, by no less a person than Dr. Wm. Allen Pusey, is the lowering of educational standards by certain schools, in order to prepare men for country practice. The remedy would fail, for it has no relation to cause. The ignoramus is just as happy in the city as in the country, furthermore—diagnosis and therapy, and human life and health are as important in one place as another. The alleged remedy is impotent, unthinkable.

Now if specialization is important, and it is, and if instruments of precision are necessary to correct diagnosis and treatment, and they are, and if country people are not satisfied with anything less, and they are not, and if good men will not go into the country without the equipment and they will not, the problem for all concerned is how to produce the facilities. After considerable consideration of this problem and some experimentation, we feel that there are three alleged remedies which merit discussion—Socialism, state medicine and community effort.

Socialism is mentioned first as it seems the most readily disposed of. By this we do not mean to speak slightingly of the scientific plan of the real socialist; nor do we wish to even deny the evidences, which may be seen on every hand of a partial fulfilling of the dream of Bellamy. *Nor* do we wish it thought that we consider socialism in its popular conception, or any of its present political brands, even a *theoretical* remedy. Our feeling is that socialism fails as a cure, not so much because of lack of inherent truth as the persistence in mankind of certain primitive instincts which are likely to continue to persist so long that, as an emergency relief, some other remedy would promise more practical immediate results, and so far as medicine goes, socialism, in its scientific sense may as well be left to the slower, possibly surer, process of evolution.

State-medicine as proposed appears to us somewhat paradoxical in that it attempts to crowd socialism into our capitalistic and profit system. It might be compared to mixing oil and water without an emulsifying agent. Nevertheless some of the principles of pharmacy have already been observed in that some of the oil is in the mortar and the pestle is constantly grinding, while the other liquids are being added in small portions. It is problematical whether or not the product will ever be finished, but if we must eventually have state medicine, we hope the emulsion will be a smooth one, whether permanent or not. Of course if state medicine will solve all the problems its proponents, who by the way constitute not a small group of political outlookers, but largely outside the profession, anticipate, there is no reason why our country practice difficulties might not be involved in the solution.

By community effort, as a remedy, we infer that the facilities for proper medical work, be furnished by society in each medical field. If each physician were to charge each individual patient a fee commensurate with the cost of service with aid of approved modern facilities, plus a fair profit reckoned by the rules of ordinary business, few could afford medical care. *But* the availability of proper medical advice and treatment is an insurance that no community cares to be without. Therefore, it is a thing for society to help supply. That Society already has this view point, more or less subconsciously, we are confident. Although there are numerous needs of rural communities to insure high grade medicine, the major necessities may be met and the remainder prophesied, by the establishment of well equipped and efficiently conducted community hospitals. For the highest accomplishment the spirit of these institutions must be that which shall tend toward a high standard. Someone has contended that country doctors, as a class, have through their environment, and its defects, tended to become too superficial in their methods to carry on high grade hospital work. Our reply is that superficialty is not a rural attribute, alone, and our contention is that any physician's ability and efficiency is bound to be increased in a hospital atmosphere. Furthermore—communities having good hospital facilities may expect vacancies in its medical personnel to be filled by well trained young men. In fact this—"is the burden of my song."

We quote from the address of President Phillips before the American Medical Association, at Dallas, Texas, last month—

"At present 25%, or less, of the practitioners, both city and country, have hospital facilities. Hospitals, or similar facilities for the application of the refinements in diagnosis and treatment should be available in all communities, and

particularly in rural districts. At present it seems somewhat difficult to supply proper hospital facilities in many small communities, but our proposed extensive programme of public health education should lead the enlightened laity to meet this demand. Every physician should be in contact with hospital facilities and experience—his progress in his profession depends on it." May we here remark that so far as the laity of Worcester County is concerned it would require but little of this propaganda. Any community in Massachusetts, whether a town or group of towns, having a population of 10,000, and most of those of 5,000, and some of less, ought to have a hospital, and if its people were earnestly approached by a united and harmonious profession, they would supply the hospital and eagerly maintain it, without undue burden upon society.

We have talked with many physicians from some of the larger towns of our district, who have expressed the wish that hospital facilities were available to them and their communities. To such we would say—why not unite with your colleagues and "put it up" to your townspeople? Without the urge of the profession rarely do hospitals appear.

With hospitals, the medical needs of rural communities are not all met, necessarily, yet they are in a fair way to become so and when that condition arrives, the future of both rural and urban medicine may be considered together.

The Massachusetts Medical Society

THE CONTROL OF THE COMMUNICABLE DISEASES PREVALENT IN MASSACHUSETTS*

With a Study of the Mortality Due to Them During the Past Seventy-Five Years

BY EDWARD G. HUBER, M.D.

(Continued from page 325)

CONTENTS

3. Measles

Measles probably existed long before the Dark Ages but up to that time its history is unknown, for the clinical and immunological characteristics by which we now distinguish it from small pox had been unrecognized. The Arabian School, in the tenth century, is credited with having been the first to make the differential diagnosis. Six centuries later Ingrassias of Palermo stands out as being the leader who revived Rhazes' work, for, during the intervening centuries the distinguishing features of the two diseases seem to have been largely forgotten. In the next century Sydenham began to advocate the same idea, but less forcibly. Ever since then, measles has had a prominent place almost everywhere. There have been excellent opportunities to study it, and among the epidemiological investigations none are better than that of Panum in the Faroe Islands in 1846.

*Published by the Committee on Public Health of the Massachusetts Medical Society.

The virus of measles has remained unknown in spite of all efforts to discover it. Probably it is filterable; and experiments indicate it is found in the secretions of the nose and throat, and in the blood. It is very easily transmitted by direct contact and by droplets from individuals in the prodromal stage. Chronic carriers are not known. The virus does not live long outside the body so infection by fomites must be recent. Vaughan thinks there is strong probability that the chief method of transmission is by the air, the particles of the virus being so small that they remain suspended in the air for hours, retaining virulence, but this belief is not generally held.

All ages and races are susceptible. The infection is most frequent in children, as was small pox before Jenner, and for the same reason. Zingher estimates that 96 to 98% of children intimately exposed (who have not had measles) contract the disease. The period of communicability extends from the very first catarrhal symptoms to the time of disappearance of the fever, but the infection is most easily transmitted before the rash appears. Practically the only immunes are those who have had the disease; this was shown conclusively by experiences in the cantonment hospitals in 1917. Infants under six months of age are thought to be immune but there is no definite knowledge on this subject. Very few individuals have a natural immunity, but one attack confers permanent immunity. Two, three, or

even more attacks are occasionally reported in the same person but a great deal of this is probably due to confusion with German measles.

The period of incubation is fourteen days to the development of the rash, or about ten days to the onset of the prodromal symptoms, although the latter may last from one or two to six days.

Measles occurs at all seasons of the year, but is most common in winter and spring. It is often spoken of as occurring in epidemic waves with a two year periodicity. Brownlee and others have endeavored to make accurate determinations of such a phenomenon, but before entirely satisfactory studies can be made better morbidity and mortality statistics must be available. The mortality figures for Massachusetts show no periodicity, for the area is too large. That there should be a certain periodicity for a limited community seems reasonable because, the disease being so very infective, and nearly all susceptibles being attacked during each epidemic, a new crop of non-immunes must develop before another epidemic is possible.

The severity of different epidemics varies considerably. If the community visited by the disease has been entirely free from it for many years, then the case mortality may be very high. The epidemics in the Faroe Islands and

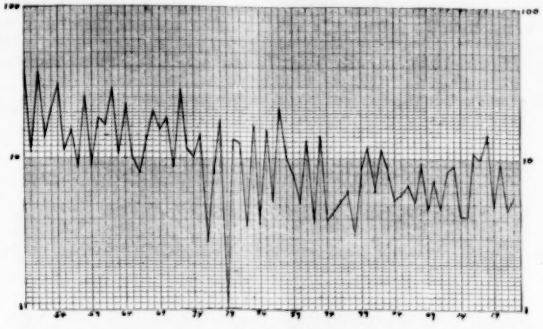


FIGURE 30
MEASLES
MASSACHUSETTS, 1849-1922
Crude Mortality Rates per 100,000

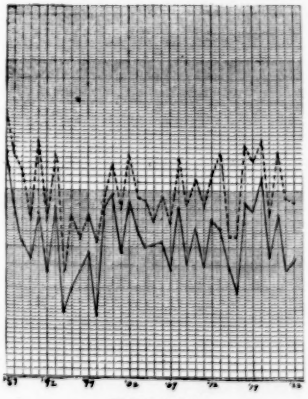


FIGURE 31A
MEASLES
MASSACHUSETTS, 1887-1922
Specific Age and Sex Mortality Rates per 100,000
---------- males under 1
———— males age 1-4

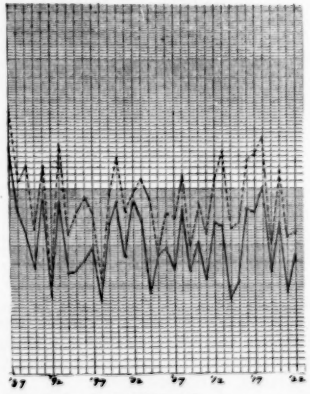


FIGURE 31B
MEASLES
MASSACHUSETTS, 1887-1922
Specific Age and Sex Mortality Rates per 100,000
---------- females under 1
———— females 1-4

in the South Sea Islands are often cited in this connection. Children under five years of age have the highest case fatality. The disease is also more fatal among the poor than among the well-to-do, since the latter are able to take better care of their sick and thus avoid the fatal complications. Measles not only predisposes to pneumonia but to a fatal type of that disease. Vaughan has estimated that the person who has recently had measles is ten times more likely to die from pneumonia than are other individuals.

Of the 16,028 measles deaths reported since 1849 (table 5), 51.1% were males and 48.9% females. However the respective sex rates in the different age periods do not differ materially from each other except at age under 1. Figure 31 shows that the rate for infants less than one year of age has been consistently higher than in ages 1-4; that the rate for males under 1 slightly exceeds that for females of the same age and in addition shows a slight uniform increase which is not so marked in the corresponding female age group; and that for ages 1-4, in each sex, the rate has remained about the same. In age group under 5 for males (fig. 32) the same tendency to a diminution in the rate is seen as is shown by the crude rate in figure 30. But in the next older age group, 5-9, the decline is greater until 1897 when, after a few years with higher rates, another uniform decrease set in which was interrupted by the influenza pandemic of 1918. Approximately the same trends exist in the corresponding female age groups except that the tendency to a downward trend is slightly less than in the male rates. This is difficult to determine accurately, however, because of the great variations from year to year. The more marked fluctuations in the rates for age group 5-9 are of course due to the fact that fewer deaths occur at those ages, only 7.5% of the measles deaths in 74 years having been in this group (table 5).

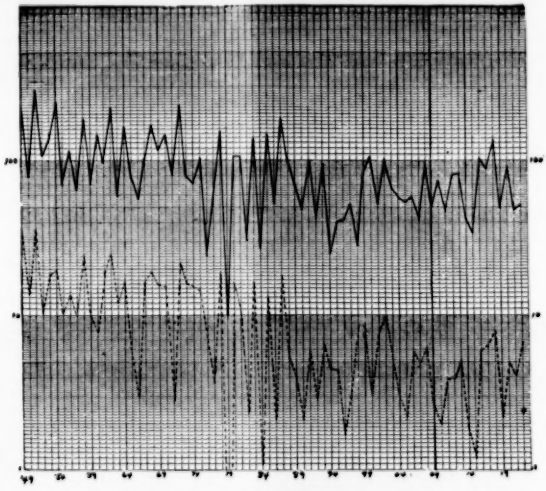


FIGURE 32
MEASLES
MASSACHUSETTS, 1849-1922
Specific Age and Sex Mortality Rates per 100,000
Males
———— age under 5
---------- age 5-9

In the Temperate Zone, 1% of all deaths are caused by measles, according to Crum. For the United States his figure is 0.71%. From 1849 to 1922, 0.56% of the reported deaths are ascribed to measles, in Massachusetts.

Figure 30 shows there was a slight but definite gradual decrease in the crude mortality rate for measles in Massachusetts from 1849 to about 1900, although the fluctuations from year to year were considerable. In 1879 there was a very wide departure from the trend line, there being only nineteen reported measles deaths in that year. From 1900 to 1915 the fluctuations in the rate were less than ever before. The trend during that time was downward as before, and about the same in amount, but as there had been a step up in the rate in 1900 the trend line is not continuous with the preceding one. Since the 1916-1918 peak another new slope has apparently been begun.

TABLE 5

MEASLES, MASSACHUSETTS

1849-1922		
Total deaths, all ages	16,028	
Deaths under 5	13,571	84.7%
Deaths, 5-9	1,210	7.5%
Deaths, all ages, males	8,181	51.1%
Deaths, all ages, females	7,834	48.9%
Deaths, all ages, sex unknown	13	
1887-1922		
Total deaths, all ages	8,197	
Deaths under 1	2,289	27.9%
Deaths, 1-4	4,905	59.8%
Deaths under 5	7,194	87.7%

groups. In fact they have been practically stationary (fig. 31) while similar rates for other communicable diseases have dropped,—consequently the increased proportionate mortality. In figure 35 is shown proportionate mortality for each of two age groups, under 5 and 5-9. These two groups have had, ever since 1849, the same proportion of deaths from measles. There was a gradual decline from 1849 to 1899 from about 2.5% to 0.5%; then followed an abrupt rise to about 1.5% which rate has been steadily maintained ever since. The under 5 group had a high proportion of deaths from measles in 1916-1918, but the older group showed no marked increase.

Attempts to control measles by any other means than immunization of those exposed have everywhere failed. Isolation as a means of control has been an almost total failure because the most infectious period is before the recognition of the disease. The report of the Health Officer of Aberdeen in 1903 is a classic, in this connection. However, in small communities, an epidemic may often be checked if the first case is known and all contacts can be isolated. This is manifestly impossible in a large city. Even in the small community when an epidemic is prevailing in surrounding larger places, eternal vigilance is the price of prevention, for in this day of very frequent travel by train and street car as well as by automobile, there are many avenues for the entrance of the infection.

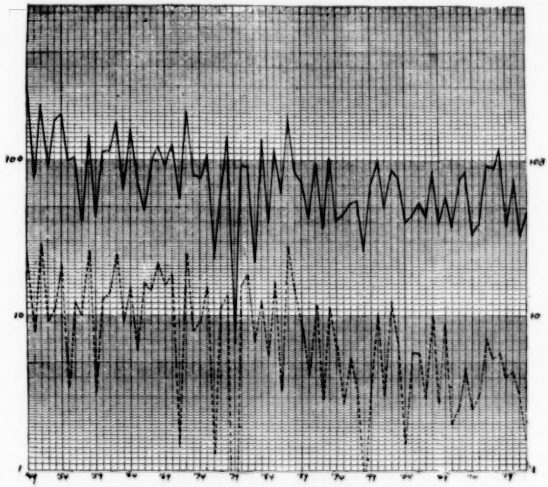


FIGURE 32A

MEASLES

MASSACHUSETTS, 1849-1922

Specific Age and Sex Mortality Rates per 100,000

Females

———— age under 5

---------- age 5-9

Figure 33 shows the seasonal fluctuations in the reported number of measles deaths. The peaks occur most often in March, April, and May, occasionally in June and July. The low months are most often September and October.

In figure 34 the respective proportionate mortalities for ages under 1 and 1-4 are shown. The former remained well below 1% until 1912, but above that proportion in more than half the years since,—a slight increase. In age group 1-4, on the other hand, there has been an increase from about 2% to 7%. Both these age groups showed high percentages in 1887, the first year they appeared in the mortality figures. There has been no comparable increase in the specific death rates for these age

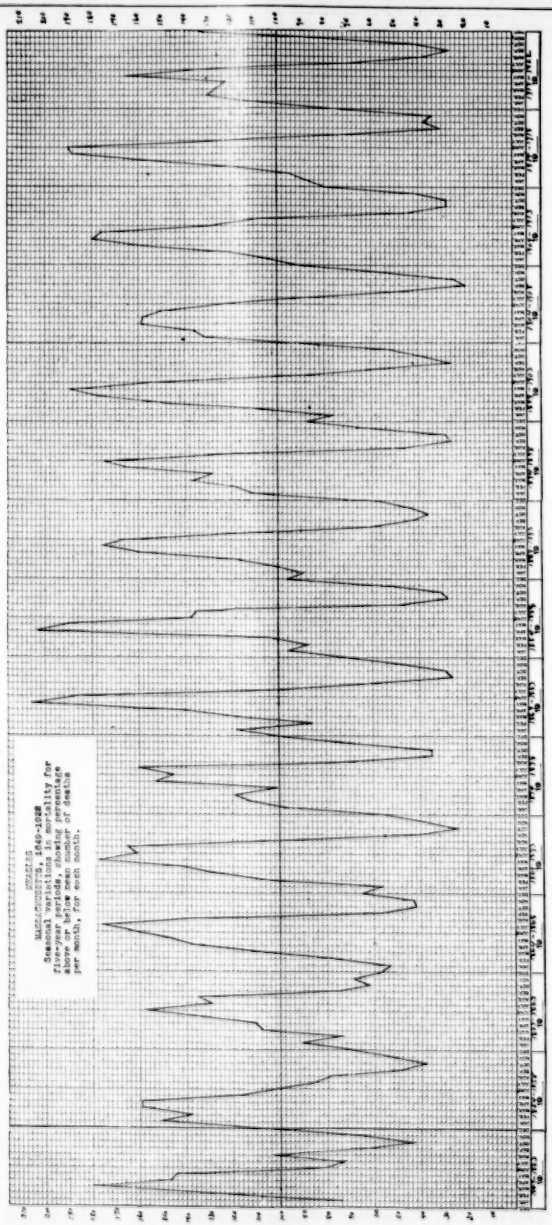

MEASLES
MASSACHUSETTS, 1840-1923
Seasonal variations in mortality for
fifteen years, showing months above
or below mean number of deaths
per month, for each month.

FIGURE 83

Measles has been removed from the list of notifiable diseases in some localities because it was felt that all attempts at control were in vain. In 1884 Longstaff in a paper read before the Statistical Society, speaking of measles and whooping cough said "It would appear that as yet preventive medicine has failed to control these diseases because the people will not coöperate to put down diseases which only affect young children." To a great extent this statement is still true.

All cases of the disease should be reported to the health department, for much can now be done to reduce mortality by lowering disease incidence in young children. Isolation of the patient should be practiced, not so much for its value as a control measure, for it protects only a very small proportion of the population, but for the patient's own good, to prevent complications. Control measures should then be taken among non-immune contacts. There are two possibilities,—active, and passive, immunization. A method of accomplishing the former was first demonstrated by Herrman, and later another technique was proposed in Japan, but neither has yet become generally practicable. Active immunization is however the ideal to strive for. Passive immunization was first accomplished by Nicolle and Conseil and is now widely applied. It consists in the inoculation of convalescent or adult (immune) serum or blood in doses which vary with the age of the child to be immunized and with the result to be accomplished. In exposed children who are under the age of six or in those who are tuberculous or debilitated or in whom infection with measles would imperil an infant at home, attempts should be made to prevent the disease. In older children, by giving immune adult blood or serum, or smaller doses of convalescent serum, the disease can be modified and made less fatal without any lessening of the immunity conferred by a typical attack. In addition, the catarrhal symptoms in such a case are almost absent so the infectivity is low. The immunity derived from an inoculation which prevents the disease is of course evanescent, and must be repeated at the next exposure.

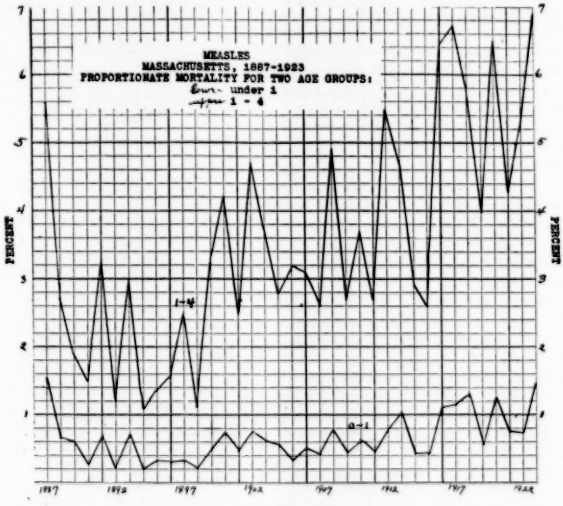


FIGURE 34

Non-immune exposed children who have not received prophylactic treatment should be excluded from school from the ninth to the sixteenth day after exposure, counting back four days from the appearance of the rash as the first day of infectivity of the infecting case. Children who have received prophylactic inoculations may continue school attendance. There should be a daily inspection of school children for rash, suffused eyes, and catarrhal symptoms. Such children who have temperature of 99° or over should be sent home and the health department notified. Children who have been given prophylactic inoculations should also be carefully inspected at the end of the period of incubation for evidence of a modified infection.

Non-immune exposed children should not be sent away from the home, for their infection has already taken place if it is to occur, and

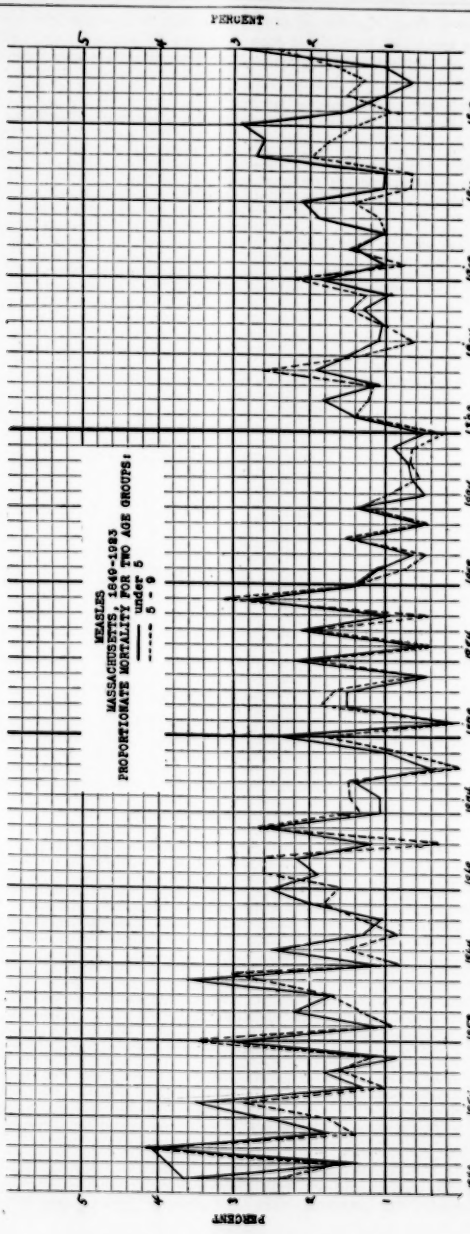

PERCENT
MEASLES
MASSACHUSETTS, 1840-1923
PROPORTIONATE MORTALITY FOR TWO AGE GROUPS:
—— under 5
----- 5 - 9
PERCENT

FIGURE 35

their removal would merely be spreading the disease.

During an epidemic the school system of daily inspection for catarrhal symptoms could well be extended to industrial establishments. Infected individuals should not be allowed to continue at work. The mortality rate in adults can be cut down only by preventing the complicating frequently fatal streptococcus pneumonias. This can be accomplished only by careful home nursing or by prophylactic inoculations of immune blood with a view to modifying the infection, or by both these measures. Hospitalization of measles patients tends to increase the incidence of fatal complications. The only hope of control in measles now is the lowering of its death rate; morbidity cannot be controlled except that the incidence can largely be postponed until after the age of six. More careful home nursing can be obtained only after an educational campaign. To this end, notification of cases and placarding of houses are valuable adjuncts.

It is the duty of the health department to secure the coöperation of hospitals and physicians in the collection of convalescent serum for use in preventing measles in children of pre-school age. Convalescent patients in the seventh to tenth day after the development of the rash, who have no complications, and who are free from syphilis and tuberculosis, should be encouraged to contribute about 500 c.c. each of blood. This blood should stand at room temperature for 24 hours, then for a similar length of time in the refrigerator. The serum is then pipetted off and trikresol added. The next step is to culture for contamination. Such serum if given in appropriate doses for the age of the child will prevent measles if no more than six days have elapsed since exposure. If it has been longer since exposure, an atypical mild attack generally results. Such serum will not be plentiful and should be distributed only for the use of pre-school children or of those who are debilitated and where no more than six days have elapsed since exposure. Other children in whom it is desired to modify the expected attack may be inoculated with citrated whole blood obtained from some immune member of the family. Attention should be concentrated on the pre-school child, and on the older child who takes the infection into the home where there are infants. As in whooping cough the danger is greater to the infant than to the one who introduces the disease into the home.

A vigorous educational campaign must be conducted, especially in the presence of an epidemic, for at that time the public is more willing to lend a listening ear to helpful information. Full advantage must be taken for publicity purposes of all occurrences which assist in the propaganda for passive immunization of infants until we have within our reach a method of active immunization more effective than the present technique.

4. Small Pox

Small pox is a disease which was confused with very few others, even in antiquity; its history has therefore been traced and recorded fairly well. Suffice it to say that it existed long before the Christian Era in India and China. From there it extended into European Turkey and Europe through western Asia. It reached America soon after Columbus' discovery, and later infected the islands of the Pacific. It was probably confused with measles more or less until, in the ninth and tenth centuries, Rhazes and Avicenna distinguished between them for the first time. Small pox became widely distributed throughout England in the sixteenth century; Sydenham had opportunities to study it thoroughly and came to the same conclusions as the Arabians. During the seventeenth century the general attitude was that small pox was a necessary evil, and that efforts at control were useless. The first small pox hospital in London was not established until 1746.

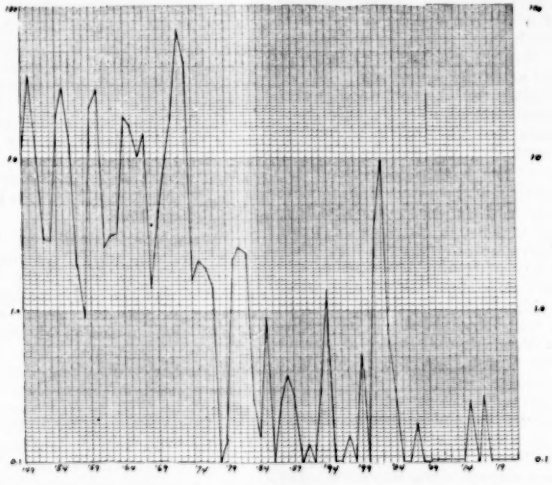
In Massachusetts small pox was the chief disease against which preventive measures were taken in the early days, but until 1721 quarantine was the only method in use. In that year, during the great epidemic when over half the population of Boston contracted small pox, inoculation was introduced by Cotton Mather and Doctor Boylston. In spite of fierce opposition this method of control grew in use and by 1752 all had accepted the principle as that of the only available means of control. In 1764, inoculation hospitals were established at Point Shirley and Castle Williams. Others came into existence later, but always under the control of the selectmen who alone were authorized to determine when enough families were infected to constitute an epidemic. Inoculations were permitted during epidemics only. In 1775 the Army in Massachusetts was ordered inoculated, by Surgeon General Church. The next year Washington ordered the establishment of an inoculating hospital at Morristown. In 1777, at Valley Forge, the entire Army was inoculated and after that all recruits were inoculated as they joined. The Act of 1776-77 (ch. 8) authorized Boston to practice general inoculation during a certain definite period of time. After the completion of those inoculations all who had not had small pox were to be excluded from the town until the selectmen declared it free from infection. It will be noted that the laws concerning inoculation differed from the subsequent vaccination laws in one essential respect. The former were restrictive and the latter are mandatory. In 1792 a new act regarding inoculations, (ch. 58) was passed, and the old laws were repealed. This was done

under the influence of a very severe epidemic which raged that year. Henceforth, instead of depending on the wishes of the selectmen, towns were authorized to vote on the desirability of having an inoculation hospital. The selectmen retained control, and were authorized to proceed without waiting for a vote, in emergency. The law of 1792 regarding inoculations was put into the Revised Statutes of 1836, although the procedure was of course obsolete.

In 1800 Doctor Waterhouse introduced vaccination into Boston. Two years later the Boston Board of Health conducted a series of experiments, and the measure was fully accepted. Act of 180 (ch. 117) allowed towns to vote to provide vaccination. Under this Act some towns went a step further and voted for re-vaccination at the end of five years. The Revised Statutes of 1836 declared that vaccination was not compulsory but the Act of 1855 (ch. 414) was one of the most important of those which have maintained Massachusetts in the lead in preventive medicine. The vaccination of all children under two years was thereby made compulsory, and unvaccinated children were not to be admitted to public schools. The enforcement of this Act was in the hands of local authorities. All the inmates of state institutions were required to be vaccinated. In 1894 children physically unfit for vaccination were exempted from the Act of 1855. In 1903 the State Board of Health was empowered to produce and distribute vaccine lymph.

In 1883 a statute was enacted by the legislature of Massachusetts requiring the reporting to the State Board of Health, of every case of small pox. Under this act the number of cases reported has varied from 1 to 220 per annum except in 1901, 1902, and 1903, when 778, 2305, and 417, respectively, were reported. The epidemic of those years was the most severe one since that of 1871 and 1872.

Figure 36 shows the Massachusetts small pox mortality rates from 1849 to 1922. After the epidemic of 1872 when the deaths were at the rate of 70 per 100,000, there was a drop to a rate of about 2. Even that low figure has gradually decreased, except for the epidemic of 1902 when the rate was 10. Figure 37 shows the seasonal variations from 1849 to 1893, which are strikingly irregular. Peaks occurred in all months from January to May, and in one quinquennium there were two very sharp peaks of equal height. The low months were always from August to October.



SMALLPOX

FIGURE 36

MASSACHUSETTS, 1849-1922

Crude Mortality Rates per 100,000

The etiology of small pox is still conjectural, but as the identification of the virus is not essential for the control of the disease, it need not receive much attention in this study. The transmission of the infecting agent probably takes place at all stages of the disease, chiefly, it is thought, by contact with the local lesion

which apparently is the chief seat of the causal factor, whatever its nature. The disease is transmissible before the eruption appears and therefore the discharges from mouth and nose are thought to be infectious. Until the etiology is cleared up the exact mode of transmission will be unknown, but as was formerly the case with the desquamations of scarlet fever, we ascribe to the most evident lesions of the disease the location of the virus. It is a well-known fact that measles and small pox are the most easily transmitted of the communicable diseases and they resemble each other in still other respects, especially in rapidity of transmission. There may yet be other unknown analogies. The virus of small pox seems to be rather resistant so that transmission of the infection by fomites need not necessarily be as immediate as in other diseases so transmitted. The contagion exists in the blood only during the very earliest stages. During the first few days of the disease, before the eruption has appeared, the symptoms are apt to be severe, with a sudden onset and with considerable prostration. The patient will therefore generally take to his bed, thus diminishing the exposure of other individuals.

There have been two types of small pox in this country ever since about 1896 when the mild form of the disease invaded Florida from an unknown source and then promptly spread over the United States. Chapin thinks that the mild type which has maintained itself with such great persistence is a true mutation. Severe cases are sometimes apparently derived from this type but as they are simply variations which tend to revert, and not mutations, they do not persist. These severe cases are probably due to one or more of the following causes:

1. Special susceptibility of the individual.
2. Intercurrent disease.
3. Heightened virulence of the organism.

The other type of the disease, the classical type, seems to have always bred true. It has been introduced from Mexico many times but has never prevailed for any great length of time. During 1923 there were epidemics of this type in Kansas, Colorado, and Ontario, where the case mortality was as high as 20 to 35%, whereas the figure for the mild type is 0.5% to 1%. The disease in Kansas and Colorado first appeared in Mexican laborers. The severe type is comparatively easy to control, for the cases are reported, and the afflicted are sick enough to remain in bed; therefore isolation is easy and effective. But in the mild type isolation has done very little toward control. Besides the difference in severity of the two forms there are other points of dissimilarity. In the severe type the period of incubation is from 8 to 14 days, oftenest 12; in the other, it is 14 to 18 days. Vaccination is slightly more protective for the severe type

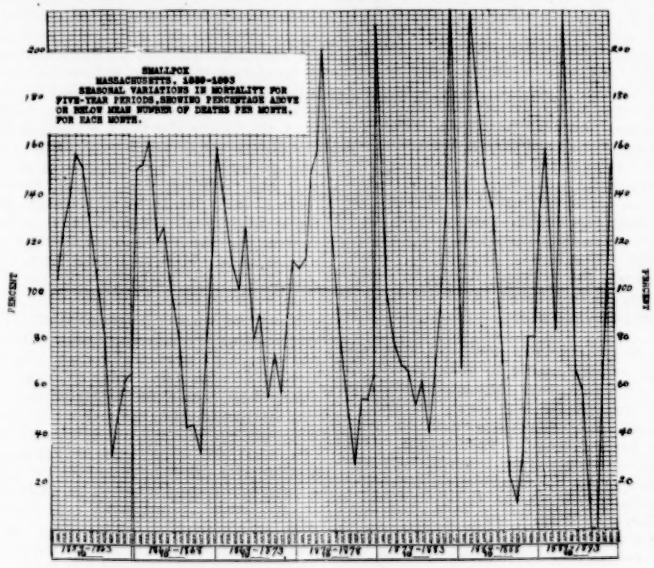


FIGURE 37

than for the mild. During the Ontario epidemic, McClenahan thought that vaccinated individuals occasionally developed small pox without any rash but with grippe-like symptoms. Such cases were able to transmit the disease.

Small pox is the most preventable of all diseases, and has been so for well over a century, yet the preventive measures are so bitterly opposed that in many localities the disease is gaining. There are several reasons for this ease of control:

1. Vaccination.
2. No disease has ever inspired more horror than has small pox, and during an epidemic, when people are frightened, they will do almost all the health department requests.
3. There are no carriers—that is, chronic.
4. It is easily diagnosed.

It is not possible to prevent the importation of the disease, nor even a certain number of secondary cases. Theoretically, such secondary cases could be restricted and the foci eradicated as easily as are the occasional outbreaks of pneumonic plague from ground squirrels in California. But practically, such success is not attainable. Health authorities are forced to resort to the prevention of the spread of small pox instead of the prevention of the disease. The only way to accomplish the latter is to immunize the population, and that seems impossible now.

During the World War small pox was negligible in all armies, owing to efficiency of vaccination. Vaughan says that among 482 cases in Detroit from April 1 to June 30, 1920, no case of small pox was discovered in which there had been successful vaccination within eight years. Twenty-five had been vaccinated within that period but unsuccessfully; how to prevent such occurrences as the latter will be discussed later.

It is advocated by some that those inidviduals who refuse vaccination should be left alone to contract the disease, if they so desire; but unfortunately it is not safe to permit such people to have their own way. In the first place, these individuals are very blatant and persuade other people who would otherwise be vaccinated to follow their leadership. A second reason is that while vaccinated persons are protected from ordinary exposures to small pox, the immunity is not absolute and a massive dose might break down their protection. The public has a right to defend itself from the acts of the ignorant and the wilfully malicious.

The state has a perfect right through its police power to require vaccination. This right has been upheld many times by the courts. The U. S. Supreme Court (Jacobson vs Mass 197 U. S. 11) has held that a state can enact a compulsory vaccination law, and in 1922 (Zucht vs King 260 U. S. 174) it upheld the right of the state to delegate to a municipality power to exclude an unvaccinated child from school. Legislatures, before they enact health laws under the police power, must be convinced of the reasonableness of the laws. Both legislatures and courts would probably consider as unreasonable the power to vaccinate anyone at any time whether small pox is present or not. Therefore health authorities are forced to rely on preventive treatment rather than on real prevention. It has been decided in Massachusetts (Commonwealth vs Pear 183 Mass. 242) that the state may require vaccination and impose a penalty for failure to be vaccinated when there is reasonable apprehension of small pox as an epidemic. And in the case of Hammond vs Hyde Park (195 Mass. 29) it was decided that the emergency exclusion from school by school authorities, of unvaccinated children, is legal even when the excluded child has a certificate showing physical disability. The investigations of Leake and Force definitely show that the better the laws regarding vaccination, the lower the morbidity. It is very evident that in small pox efforts to educate the public are not sufficient to obtain control of the disease and that these educational efforts must be supplemented by good laws with strict enforcement,—since the opposition is so wealthy and active. It is very expensive for the community to cope with the antis, but it must be done to some extent.

There are two methods of control: voluntary vaccination, with quarantine of those who will not accept protection; or compulsory vaccination. The former is very expensive and costs many lives, especially those of the young who are victims of the ignorance of their elders. Compulsory vaccination is always provocative of determined opposition, with a great deal of trouble for the health officer. The latter should maintain a position slightly in advance of his public, but not so far ahead that his support changes to opposition. In the presence of the classical form of the disease the heath officer must use all available powers but when the mild type prevails his best policy is to be tactful, remembering that the best way to teach the value of vaccination is to demonstrate what it accomplishes in an actual epidemic. Full advantage should be taken of every epidemic, while it is fresh in mind, to secure needed legislation and funds for health work.

Compulsory vaccination is undoubtedly the primary requisite in the control of small pox. It is impracticable to compel vaccination in infancy, for many mothers not otherwise opposed to the measure will not accept it for an infant. The recommendation of the U. S. P. H. S. for vaccination by the age of six months, with revaccination at six years of age and whenever there is an epidemic, is the ideal procedure and should be recommended to all. Advice as to vaccination should be included in any circulars sent to parents in the few months after a birth

registration and all medical men should endeavor to show the public that early vaccination is the only safe rule. Parental objections have usually disappeared by the time a child has reached school age. At this age compulsory vaccination should be the rule everywhere. Re-vaccination should also be compulsory at intervals of not less than seven years, the last one being at about the age of fourteen. There is at present an undue amount of opposition to vaccination and too many state-wide attempts to abolish it to hope for any advanced steps in legislation unless the medical profession and its friends begin an active offensive, instead of a more or less passive resistance to the antis. Compulsory vaccination should be effective in all schools; private, parochial, and public. Any compulsory vaccination law in order to be effective must necessarily have a penalty attached. The Society for the Prevention of Cruelty to Children prosecutes if neglect of children is shown. An unvaccinated child which contracts small pox is certainly a neglected one but conviction of the parents would be difficult as long as it is impossible to say that a vaccinated individual has absolute immunity. A compulsory vaccination law should be so framed that evasion of compulsory school laws thereby is impossible. Legislation which merely excludes unvaccinated children from school in the presence of an epidemic is insufficient, since this permits outbreaks of the disease.

When a good law has been obtained, its rigid enforcement is just as important. And closely associated with the enforcement is the appreciation on the part of the physician of the importance of vaccination technique and of the careful interpretation of the results of the operation. The drill method of vaccination, leaving one drill mark uninfected as a control, seems the best. In case of first vaccination, the operation should be repeated until successful. In re-vaccinations there should be daily inspections on the three succeeding days in order to detect the reaction of immunity if it appears. This immediate reaction should not be judged by the degree of the reaction but by the speed with which it appears, the vaccine being potent. A prompt, slight, reaction shows a high degree of immunity. It must be remembered that an impotent vaccine may produce an immediate reaction in an individual who should have had vaccinia or its modified form, so a vaccine which does not give a high percentage of "takes" in unvaccinated persons is not reliable. Attention to these details might have saved some of the twenty-five cases mentioned previously. Modified vaccinia apears in three to seven days and is evident to the layman who should see that the lesion is examined by a medical man. In the absence of any positive reaction whatever, it seems justifiable to assume either that the vaccine was inert, or that the virus was immediately washed off, or that an antiseptic was applied to the vaccination wound immediately after the operation, or that the operation itself was inefficient. In such an event, whatever the cause, the operation should be repeated until successful. All this involves very simple records but it does not seem too much to request of the physician as his share in the campaign.

Isolation of all cases; vaccination or complete quarantine of all contacts; exclusion from school and from industrial establishments of all the unvaccinated; newspaper publicity with full daily information to the public of all deaths;—all these measures are applicable in an epidemic. The last-named one will be opposed by business interests but is best in the end, for it inclines the public toward vaccinations. This method had satisfactory results in Denver.

(To be continued)

FIGURES

TABLES

MEDICAL PROGRESS

PROGRESS IN GYNAECOLOGY

BY FRANK A. PEMBERTON, M.D., F.A.C.S.

BLAND[1] has looked up the results of the various operations for dysmenorrhoea. He finds the following types (A) Dilatation and curettage; (B) Dilatation and curettage and a stem pessary; (C) Dilatation and curettage and a cervical hysterotomy; (D) Dilatation and curettage with cervical hysterotomy and dilatation maintained with a gauze pack; (E) Dilatation and curettage and a Pozzi cervical hysterotomy; (F) Dilatation and curettage and

a Dudley posterior cervical hysterotomy; (G) Dilatation and curettage and various operations to improve the position of the uterus; (H) Various operations depending on the indications such as fibroids, pelvic inflammation, ovarian tumors, etc. Johnstone found that there was relief in uncomplicated cases with dilatation and curettage in 79.8%. Blacher relieved 33% permanently and 33% more temporarily by dilatation and curettage. Holden relieved 40% and Rawls 61.1% by dilatation and curettage. Using dilatation and curettage and cervical hysterotomy as under classification C and D, Blair and Clelland each cured about 80%. Bland believes that the Pozzi operation exposes the cervical mucosa to infection and therefore should not be used. He feels that the Dudley operation properly performed is superior to it. Bland's experience has been that simple dilatation and curettage seems to be as effective as the supplementary cutting operations on the cervix. The reviewer feels that, in doing a dilatation for dysmenorrhoea, emphasis should be placed on maintaining the dilatation with the Goodell dilator for at least five minutes. Most operators simply dilate the cervix as far as desired and end the operation then.

Violet[2] believes that some cases of dysmenorrhoea are due to irritation of the uterine nerves from inflammation in the broad ligament. These nerves form a plexus in the parametrium to the inner side of the ureter and send branches to the bladder and rectum. His method of treatment is to make an incision in the broad ligament close to the ureter, explore the base of the broad ligament with the finger, divulse any indurated area, and cut any resisting bands in an attempt to free the nerves from the inflammatory tissue. He has done this in four cases, on one side only, and has relieved them all. This is, of course, a condition for further investigation.

Efforts to isolate the ovarian hormone continue but there is no uniform clinical experience and the chemical formula has not been proved. Carlson[3] finds that hormones from follicles and the corpus luteum affect the menstrual cycle, the relation between the fertilized ovum and the endometrium, mammary hyperplasia, and suppression of follicular growth. Solomon and Gatenly[4] found that liquor folliculi seems to have no effect on menstrual disorders when given by mouth in humans but does in rats. Corpus luteum extract, given by mouth, was found useful in scanty menstruation, sterility, and dysmenorrhoea. Burrows and Johnston[5] believe there is a growth stimulating substance in the liquor folliculi. Allen, Pratt and Doisy[6] find that there is a hormone in the liquor folliculi, placenta, and corpus luteum which produces the same reaction on the genital tract of the spayed rat. They do not know whether this substance is elaborated by the placenta or whether it is stored there after being produced in the ovary. All this experimental work is valuable but there is a personal equation in the conclusions from the clinical tests and there is no standard chemical method as yet for the removal of the active substance from its sources and no uniform dosage. Allen, Pratt and Doisy measure theirs in rat units, that is the amount necessary to produce a reaction in that animal.

Several articles have appeared recently which would convey the impression that retroversion of the uterus causes no symptoms. The best authorities however believe that it may cause backache. Polak says that retroversions will in time develop local pathology or complications due to mechanical pressure and interference with the pelvic circulation. It is generally agreed that other symptoms than backache are due to complications such as prolapse, adhesions, and circulatory stasis. The cases must be treated accordingly and again we wish to emphasize the fact that a suspension alone will not relieve the patient's symptoms if she has a lacerated cervix, cystocele and rectocele as well as a retroversion. These must be repaired at the same time. This is still frequently not done. Donald[7] and Ward[8] have written good articles on this subject.

The operative treatment of prolapse remains the same, that is, each surgeon uses the method which he finds most satisfactory. Gibson[9] describes again the Emmet-Baldwin operation in an excellent article giving the technique. This is the operation in which the lateral expansions of the pelvic fascia are brought together in front of the cervix so as to hold the cervix back in the pelvis by a bridge of fascia. A special type of cystocele operation must be done and a good perineorrhaphy for a perfect result. This article should be read to understand the method. He reports 89 cases, 45 of which have been followed. Forty-three of these are cured and two are partial failures.

McGrath[10] has written an excellent review of the causes and treatment of endocerviciitis and it seems apparent that nothing has been added to the subject since the last article on Progress in Gynaecology. It may be emphasized again that treatment which does not destroy the cervical glands which cause the discharge is of no avail. The application of iodine, argyrol, mercurochrome and other drugs is of palliative value but does not cure. Cure may be obtained by the application of severe causties such as potash or zinc chloride which actually destroy the glands; by diathermy and fulguration in some cases; by radium if judiciously used; by cauterization with the knife cautery, which frequently has to be repeated; and by removal of the glands by Sturmdorf's conical enucleation or amputation of the cervix.

The treatment of acute pelvic inflammation is described by Watkins[11] and Worral[12]. Wat-

kins advises conservatism, that is rest, food, air, and other medical measures, surgery being indicated in 50% of cases and then only when immunity to the acute infection has been established. Worral advises more aggressive treatment consisting of drainage through the posterior cul de sac by a vaginal operation and then an abdominal operation a week or ten days later to remove any diseased tissue with drainage again through the vagina.

This is the same conflict in opinion which arises every year. We believe that the consensus of opinion is that most authorities tend toward the conservative method and do not operate unless the residuary lesions, usually adherent retroversion, cause symptoms. Pelvic inflammation will quiet down if time is allowed and it is reasonable to feel that operation is safer in the chronic than in the acute stage.

To hasten the resolution of pelvic inflammation foreign protein may be injected, vaccines may be used, and diathermy may be applied. Mohler[13] reports ten cases treated by the injection of 5 to 10 cubic centimeters of boiled milk at weekly intervals for 5 or 6 doses. All seemed to be benefited by it. It is still an unestablished method for general medical care will usually result in as much improvement in the same length of time. Horalek[14] used vaccines and had good results in the acute and subacute types but the benefit did not seem as apparent in the chronic. Cherry[15] used diathermy in 52 cases of pelvic infection and decided that it helped in the disappearance of the disease. It is of special benefit in the gonococcus infections both of the cervix and tubes.

Kousky[16] reports on 100 dermoid tumors of the ovary. The symptoms are those due to pressure and increased menstruation. X-ray showed shadows in half of a few that had this examination. They were bilateral in 5%, showed a malignant change in 1%, and infection in 3%. The unilateral ones do not appear to interfere with fertility but the bilateral do. Duncan[17] reports a case with bilateral dermoids in which he removed one ovary and resected the other showing that it is feasible to preserve some ovarian tissue in some of these cases.

Schwartz[18] has studied the torsion of pedunculated ovarian tumors. The pedicle is on the anterior face of the tumor when it is small but as it grows up out of the pelvis the promontory of the sacrum impinges on its equator and acts as a fulcrum so that any pressure upwards causes a drag on the pedicle making it rotate the tumor so that the lower part of the tumor will rise above the attachment of the pedicle. The condition does not become pathological until the rotation amounts to 180 degrees. From ½ to 2 complete turns is the rule but 6 have been described. Sudden movements, coughing, sneezing, and straining at stool are the exciting factors. Occlusion of the venous return is the usual cause of symptoms, the arteries being rarely shut off. Torsion occurs in from 15 to 25% of all ovarian tumors and is proportionately more common among the solid ones.

Regarding endometrial adenomyomata or the "chocolate cysts" described by Sampson most authorities agree that the etiology is from a back flow of pieces of endometrial or tubal epithelium through the tubes into the pelvic cavity with implantation and growth on the ovary, broad ligament, back of the uterus and any other structures which may lie in the pelvis. Regular menstruation takes place in these growths so that cysts full of blood are formed which rupture from time to time, spreading more epithelium, and letting out blood clot which results in the formation of adhesions. Those in the ovary are the ones which grow the fastest and have the greatest tendency to perforate. Bailey[19] agrees with this theory and describes fully the various changes that take place. He has found free epithelium in tubes removed during menstruation. Robinson[20] believes that these adenomyomata are derived from the celomic epithelium, stimulated perhaps by an inflammation. King[21] has analyzed 122 cases and found the site of the implantations as follows: rectovaginal space 52; peritoneum 26; ovary 23; uterus 17; and tubes 4. The classical symptoms are acquired dysmenorrhoea and sterility. There may be acute attacks of pain when perforation takes place but they rarely call for emergency operations. The treatment is surgical and may be conservative if children are desired.

The use of radium and x-ray for profuse menstruation and fibroids has shown no new developments. The indication and contraindications remain the same. Graves[22] finds that radium may cause an immediate and painful enlargement of retention cysts of the ovary if they happen to be present. Several men report unfortunate results such as the necrosis of fibroids, the treatment of ovarian cysts with radium in the uterus when the diagnosis was thought to be fibroid, etc. These bad results are due to poor selection of cases and careless diagnosis. They emphasize the point stressed by the gynaecologist that radium and x-ray should not be used without a careful examination under an anaesthetic beforehand but which is still disregarded by many physicians. Radium is useful in the destruction of urethral caruncles and appears to be the treatment which is least likely to be followed by a recurrence. Pomeroy and Milward[23] report a series treated by an application of about 300 milligram hours of radium with excellent results.

There are several articles on the treatment of cancer of the cervix with radium. The concensus of opinion is that it is the best method for treating the hopeless, inoperable, and borderline cases. A rare hopeless case appears to be

cured and many are relieved for a time. From 1 to 16% of the inoperable cases go for five years without recurrence, a good many live for two or three years, and nearly all are relieved of discharge, gain weight, and feel better for varying lengths of time. When the disease begins to extend again after radium treatment it does seem as if it frequently grew much faster than normally. The borderline cases show corresponding clinical cures, the percentages from various clinics running up to 45% and of the early cases up to 93%. It must be realized and stressed that such results as these are with the use of comparatively large amounts of radium, that is at least 100 milligrams and in most clinics more than that. The trend regarding dosage seems to be towards one large dose either in twenty-four hours or during a few days, the amount running up to 10,000 milligram hours with a minimum of 2400. This may be repeated in not less than three months if it seems indicated. The dosage must be carefully considered in advanced cases because if the disease is in the bladder or rectal walls and the treatment is too vigorous a fistula may be caused and the patient is symptomatically worse off than ever. If there is hope of curing the disease it is fair to give the large dose in these cases, as the fistula may be closed later[24,25,26,27,28,29].

The question as to whether radium is better than operation in the early cases is still in abeyance. Those who are expert in the performance of the operation or who have no radium still operate in selected cases. If there is any constitutional contraindication such as obesity or heart, lung, or kidney disease radium is the better choice. Those who have large amounts of radium such as the Memorial Hospital in New York do not operate on cancer of the cervix. Most clinics have given up pre-operative radiation but many give both radium and x-ray after operation.

It is definitely decided that radium has no place in the treatment of cancer of the fundus of the uterus[30]. Operation gives a cure of 65 to 70% while the application of radium in these cases is blind. Further there are metastatic growths in the ovaries in about 10% of cases which can be reached only by operation. Complete hysterectomy is the operation of choice.

The literature on sterility is largely concerned with the relation of the endocrine system to the subject and the Rubin test of tubal insufflation. According to McCann[31] scanty or irregular menstruation with sterility is due to "ovarian inadequacy" and it may improve or become normal after marriage. Atrophy of the genital organs due to lactation may be prolonged and the atrophy become excessive with a resultant lowered fertility. He believes that it is due to a disturbance in the endocrine system because the milder cases seem to respond to treatment with ovarian and corpus luteum extracts. Premature senescence is another cause which may be relieved by early treatment but if atrophic changes have taken place in the vagina the prognosis is poor.

This subject is still vague because so little is known scientifically about the internal secretion of the ovary. There does seem to be a relation between the thyroid and the genital system and the pituitary and the genitalia. More is known about the former because thyroid extract is a definitely known substance and some cases of scanty and irregular menstruation respond to thyroid treatment, but it is a question whether it acts as a stimulus to the ovary or directly on the uterus. So far as we know no one has given thyroid extract to a castrated woman to see if it would cause a menstrual flow. If anyone has such a patient it would be well worth trying, especially soon after the castration before the uterus becomes completely atrophied.

Kennedy[32] believes that there may be a spasm at the isthmus of the tube which causes sterility by preventing the passage of the fertilized ovum into the uterus. It is associated with anteflexion and dysmenorrhoea. He believes it is due to an improper balance between the autonomic and sympathetic nervous systems. Polak believes that this stenosis might be due to pressure on the folds in the tube, pushing them together. It should be remembered in this connection that Meaker found, in some cases, that the giving of Benzyl Benzoate before the insufflation test seemed to facilitate the passage of the gas and he felt that a spasm of the tubes was prevented by the drug.

Bonney[33] and Ferguson[34] have presented simplified insufflation apparatuses which have no special advantages over many others. Bonney makes a good suggestion which is that when operating on closed tubes the insufflation should be carried on and the tube slit up towards the uterus until gas escapes from it.

Rubin[35] analyses 100 insufflations and comes to the conclusion that the best time to do it is 4 to 7 days after menstruation, because the endometrium is quiescent, less liable to infection, there is less chance of blowing pieces of endometrium into the pelvis, and the patient is most probably not pregnant.

Morgan[36] reports the control of the Rubin test in 57 cases. In one case the only remaining tube was patent by the Rubin test and the patient became pregnant after a curettage. In the other 56, three had normal tubes according to the test and they were found so at laparotomy. Of the others 52, all diagnosed as occluded by the test, showed gross pathology at operation. The other one was diagnosed as having occluded tubes but they were found to be normal. It is evident that in competent hands the test is very accurate.

The writer of the review wishes to acknowledge his indebtedness to Polak's monograph in the Practical Medicine Series for an excellent bibliography and abstracts, which he has used in combination with his own bibliography for 1925.

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THE CITIZEN'S RESPONSIBILITY FOR SUMMER TYPHOID

THE season for summer typhoid is upon us. Although typhoid fever is much less common than formerly the disease still lurks in unexpected places. According to some writers, as many as four or five per cent of all persons who have ever had typhoid fever still remain carriers of the disease germs and are therefore potential dangers to those with whom they associate. These persons are the sources of summer typhoid.

Thus it behooves the happy vacationist to beware lest after going forth in joy to forget dull care, he return in sorrow to go through a siege of typhoid fever. It is not possible for the casual visitor in a strange region to spot and shun all typhoid carriers, but it is possible for him to take certain precautions to protect himself from infection.

Typhoid Inoculation. Three doses of typhoid vaccine given a week apart will render one immune from typhoid fever for two or three years. This is the one measure that will protect against all possible sources of typhoid infection. It is the one good trick that is worth a hundred poor tricks, if we are to profit by the experience of the sly old fox in the fable.

Flies. Typhoid fever germs may be transported directly from the discharges of the human carrier to the food of the victim by flies. Vacationists are advised not to stay at a summer resort where flies are tolerated. Summer visitors can control the fly nuisance in any vacation resort. By registering strong "kicks" about flies and moving on to the next place, summer visitors can convince the proprietors of hotels and boarding houses that "fly presence" means loss in business. The proprietors will do the rest.

Water. Everyone knows that the germs of typhoid fever may be carried in water. In order to be so carried the germs must reach the water from a human being. The vacationist should make sure that the water he drinks is either protected from contamination by human waste or is boiled before drinking. A rule of discretion would be, if in doubt, boil.

Milk. Cows do not have typhoid fever. Milk can become contaminated only by the human handler. As milk is an excellent food for typhoid germs they multiply in it so that the victim gets massive doses of infection. The vacationist who drinks pasteurized milk is safeguarded against typhoid fever and other diseases from this source.

Foods, Milk and Drink. Cooks, waiters, and soda dispensers are apt to dispense typhoid fever germs with their foods if they happen to be typhoid germ carriers. The casual visitor can not know who may be carriers, but he can acquire some information as to who are so careless and uncleanly in their habits as to increase the likelihood of spreading infection if carried. A summer visitor can insist that hotels, restaurants and boarding houses which he patronizes are clean, that wash room facilities are afforded for cooks, waiters, and soda dispensers, and that they actually do wash their hands very carefully each time before handling foods. Such measures will go a long way toward protecting visitors from possible infection by carriers.

Protecting Others from Yourself. The summer visitor may himself be a carrier and not know it. For this reason he should take measures to protect others. He should use sanitary appliances provided and not scatter about promiscuously waste from his own body that may be infective. In other words he should take the precautions to protect others which he expects others to take to protect him.—*Connecticut State Department of Health Weekly Bulletin.*

Case Records
of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY
RICHARD C. CABOT, M.D., AND HUGH CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 12331

A CASE WITHOUT A CLINICAL DIAGNOSIS

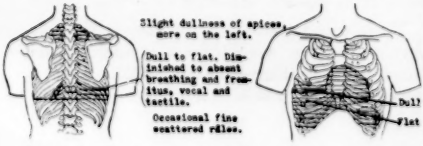
MEDICAL DEPARTMENT

A married Irishwoman of thirty entered March 15, thirteen years before her second admission, complaining of pain at the right costal margin.

She gave a history of scarlet fever followed by measles eight years before admission, and malaria ten months ago. The diagnosis was made by a member of the staff of this hospital. For the past few months she had felt chilly. She urinated once at night. Six years before admission, before her marriage, she weighed 150 pounds. Her average weight during the past year was 135 pounds, her weight a week before admission 133 pounds.

For six weeks she had had pain in the right lower chest on deep inspiration. Otherwise she felt perfectly well except for chilly sensations and slight weakness which had persisted since her malaria.

Examination showed a poorly nourished woman, somewhat pale. (Weight 123¼ pounds.) Cervical glands slightly enlarged, discrete and non-tender. Teeth carious. Slight pyorrhea. Tonsils slightly enlarged. Apex impulse of the heart visible in the fourth space, nipple line. Percussion showed no other enlargement. Action slightly rapid, regular. Sounds of fair quality. Pulmonic second sound slightly accentuated and reduplicated. Artery walls just felt. Blood pressure 105/68. Lung signs as shown in the diagram. Abdomen somewhat distended, soft and tympanitic. Small umbilical



hernia. Ribs seemed slightly rigid over right lower thorax. Liver dullness from fourth rib to costal margin. Edge not felt. Splenic dullness enlarged, edge not felt. Traube's space obliterated. Pupils normal. Left internal strabismus. Left knee-jerk greater than right.

Urine alkaline at one of two examinations, cloudy at the other, specific gravity 1.024 to 1.026, pus at both examinations. Blood normal. Sputum: no tubercle bacilli at two examinations.

X-ray showed thickened pleura; no evidence of effusion.

The chart was normal.

The patient felt perfectly well except for pain in the right chest. The chest was strapped. March 21 she was discharged relieved.

She felt well until October, twelve years later. Then she was awakened one night with severe stabbing pains in the right upper quadrant. She walked the floor all night. Soon after the onset she had chilly sensations all over her body. Next day she felt perfectly well. She had a similar attack every three weeks until the end of January. After taking pills given by her physician the pain stopped. Two weeks before admission she had an attack of "indigestion—food did not go any farther than her throat". She did not vomit, and never had any discomfort. Medicine given by her physician did not help her. January 30 she had real chills which lasted all night. For the next three days she felt chilly. February 1 to 6 she vomited two or three times a day without relation to meals, she thought perhaps because of the many medicines she had taken. The vomitus was brown and very bitter. Her bowels, previously regular, were constipated from the onset of the illness. She had no jaundice. She lost five pounds during the illness.

Examination at her readmission February 8 showed a fairly well developed and nourished woman, slightly pale. Teeth all false. Lungs normal. Heart rate rapid. Sounds of rather poor quality. Pulmonic second sound reduplicated. First sound at the apex indistinct. Electrocardiogram showed sino-auricular tachycardia, rate 125, diphasic T_2 and T_3. Pulses of rather poor volume and tension. Artery walls normal. Blood pressure 100/70. Areas of redness under the left breast, around the anus, and between the buttocks. Abdomen: slight tenderness over McBurney's point on deep palpation. Pelvic examination negative except for patent Bartholin's ducts. External hemorrhoids. On the inner side of the right leg there were three small ulcerated areas, the sides sharply demarcated and penetrating, with granulation tissue at the base. Right pupil slightly greater than left. Fundi essentially normal.

Urine cloudy at both of two examinations, the slighest trace of albumin at one, specific gravity 1.020, amount normal when recorded, 45 leucocytes per high power field at both examinations, occasional red blood corpuscles at one, a catheter specimen, culture from which showed a moderate growth of pneumococci. Renal function 20 per cent., twenty minutes late. Blood

examination normal February 8 and 11. February 12 it showed 31,700 leucocytes, 100 per cent. hemoglobin, 5,968,000 reds. Wassermann negative. Non-protein nitrogen February 8 64 milligrams, February 10 82 milligrams. Uric acid 6.4. Creatinin 1.6. Lumbar puncture February 10: 5 cubic centimeters of clear colorless fluid, initial pressure 55, pulse and respiration normal, jugular compression 250, release 55, after withdrawal of 5 cubic centimeters 30, 4 cells. Ammonium sulphate negative, total protein 46, goldsol 0000011000, Wassermann negative. Stomach contents; about 150 cubic centimeters of thin green foul smelling liquid, guaiac very strongly positive. The stomach was washed and six ounces of black coffee introduced.

X-rays: Neither kidney shadow was well defined. There were no shadows visible which suggested calculus. Just below the margin of the liver was a pyriform shadow of increased density, perhaps representing gall-bladder. Just to the left of the lower sacral segment was a shadow of increased density, probably within the bowel. A film of the chest was considerably overexposed.

Until February 11 the temperature was 97° to 99.3°, the pulse 80 to 100, the respiration normal.

The day after admission examination showed Kronig's isthmus diminished on the right side, râles after cough at the right base posteriorly and bronchovesicular breathing below the right clavicle. The ankle jerks were not obtained.

February 11 the patient had an uncomfortable day. She complained that food stuck at about the level of the manubrium, and vomited a good deal, chiefly water recently taken. The breath was ammoniacal.

In the evening she was given 2000 cubic centimeters of 2½ per cent. glucose subpectorally. Shortly afterward she became pulseless. The blood pressure could not be obtained. The extremities were cold and she had slight cyanosis. After she was given caffein and put in shock position the pulse rate was slightly improved, 110. The chest was clear. The heart sounds were fair. The pupils were normal and reacted. She was conscious, answered questions, and had no pain. The leucocyte count was 7,000. A surgical consultant found no abdominal condition which could account for her condition. The left ovary (?) was easily palpable.

February 12 the visiting physician found irregular pupils and loss of reaction. The left pupil was greater than the right. The patient was semiconscious. No pulse was obtainable. The heart was regular, the sounds fair. The rate was 120 at the apex. No murmurs. There was some cyanosis and occasional hiccup. Once or twice she made an attempt to cough or vomit. There was dullness and decreased respiration at the right base; no evidence of consolidation or of anything intra-abdominal. She moved her right leg after an attempt at coughing. There was a slight suggestion of Kernig on the right, less on the left. The respiration was not atypical but shallow.

She continued to fail. The radial pulse was not obtained all day. Capillary stasis was very prominent, with the increased red count and hemoglobin already noted, and thick viscous blood after pricking the ear. The heart stopped one or two minutes before the respirations. Just after the respirations had stopped the heart was started again by the intracardiac injection of one cubic centimeter of adrenalin. The heart stopped again in about one minute.

Discussion

BY RICHARD C. CABOT, M.D.

NOTES ON THE FIRST ENTRY

I should say there is no enlargement of the heart.

The diagram shows an accumulation of fluid at the left base which seems to have come on insidiously, which corresponds to the idea of a tuberculous pleurisy. I should think they had evidence of nothing except the fluid.

There had probably been effusion, but it had gone before she entered.

The first entry gives us, so far as I see, the history of a pleurisy the type of which we cannot judge,—just as likely to be tuberculous as any other.

NOTES ON THE SECOND ENTRY

At the second entry the attack is much more like a gall-stone attack than anything else. It is a night attack, she has fever with it, chill, and it is all gone the next day.

I should like to know what the pills given by her physician were.

I have my doubts about food going no farther than her throat. It probably did.

Up to the beginning of the physical examination I still feel that gall-stones is the most likely diagnosis.

NOTES ON THE SECOND PHYSICAL EXAMINATION

I take it that both pupils reacted.

These leg ulcers make us think of syphilis. The pupils do not show anything much like it. Then we wonder whether the attacks of pain might be gastric crises of syphilis, but they do not sound much like it to me.

The non-protein nitrogen is high, though not tremendously high. The creatinin is pretty nearly normal, the uric acid a little high. The spinal fluid is perfectly normal. The rest of the examination is negative. It seems as if they would have been likely to do a Graham test, but it is not mentioned.

Kronig's isthmus is the resonance at the top of the lung. This record means dullness at the

right apex. The isthmus is between the shoulder structures on the outside and the neck muscles on the inside, and represents the top of the lung. They are going after evidences of tuberculosis now. They are working hard, but they don't think they have got it.

The absence of ankle-jerks is important, especially as we have some other signs suggesting syphilis.

Everybody was up in the air on February 11. We don't know why she got the symptoms with which she entered. She seems to have got over them, whatever they were.

The right side is the side where we had pleurisy before. These signs probably were due to old adhesions.

DIFFERENTIAL DIAGNOSIS

I do not know what this patient has, and I do not believe anybody did know when she died.

A PHYSICIAN: It says in one place "subdiaphragmatic pleurisy".

DR. CABOT: She certainly did not seem to have a peritonitis, either local or general, which is the usual cause.

A PHYSICIAN: Would you call that shock?

DR. CABOT: I don't know.

A PHYSICIAN: If she had malaria would you think of a liver abscess?

DR. CABOT: We can think of it, but I do not think she could die of it in this way. She would have had a longer course.

A PHYSICIAN: Cholecystitis?

DR. CABOT: We have not much of any local symptoms. Here they didn't find anything except that they saw a shadow which might have been the gall-bladder.

A PHYSICIAN: The symptoms of subdiaphragmatic pleurisy would suggest a disturbance there. If the chest was clear could not this be abscess of the liver?

DR. CABOT: We have two who vote for abscess of the liver. Cholecystitis is also suggested. I am against both.

A PHYSICIAN: Tuberculous meningitis?

DR. CABOT: Suggesting that is the mental condition and that is about all. The last time we tapped the spinal cord it was negative—four cells, which is normal. I do not see how she can have any variety of meningitis with that spinal fluid.

A PHYSICIAN: What do you call the sudden collapse after the glucose?

DR. CABOT: I do not know what that was. I do not know when I have been as entirely nonplussed by a case as by this. I do not even know in what part of the body to look for a cause of death.

DR. RICHARDSON: What was the blood pressure?

DR. CABOT: It was low, not striking in any way; one hundred over seventy.

A PHYSICIAN: How about those red spots?

DR. CABOT: Those do not suggest anything in particular to me. The ulcers on the leg are perhaps as definite as anything we have, with the loss of ankle-jerks. They certainly make us think of syphilis. But we have not much of anything to back it up. The cerebral symptoms are not definitely those of a syphilitic lesion.

A PHYSICIAN: Would you consider miliary tuberculosis?

DR. CABOT: Miliary tuberculosis is always worth thinking of. We have a history here of what may perfectly well have been tuberculosis of the pleura, and I do not see anything that can exclude a miliary terminal process.

A PHYSICIAN: Would the X-ray suggest it?

DR. CABOT: We have no recent X-rays.

A PHYSICIAN: Wouldn't the length of time be against miliary tuberculosis?

DR. CABOT: No.

A PHYSICIAN: She at least showed some kidney deficiency. The non-protein nitrogen was high at two examinations, and the uric acid was high.

DR. CABOT: Should you say she died of uremia?

A PHYSICIAN: No.

DR. CABOT: I should not either. It is a high non-protein nitrogen, but otherwise the urine is good enough.

A PHYSICIAN: The last X-ray was overexposed.

DR. CABOT: Yes, we have no recent X-ray of the chest that I see.

MISS PAINTER: It is the overexposed one of February 10.

DR. CABOT: That would not show up miliary tuberculosis, of course.

A PHYSICIAN: How about tuberculosis of the kidney?

DR. CABOT: She could not have tuberculosis of the kidney and die of it with this history. She would have to have some local symptoms, and she has not had any. Ordinarily they have bladder symptoms.

A PHYSICIAN: If we had calcification that would show.

DR. CABOT: Yes, but tuberculosis if present in this case would be so recent there would not be time for calcification. I think she might perfectly well have miliary tuberculosis with a plate like that, because that is an overexposed plate.

How many think it is septicemia? (Eight hands.)

How many think it is miliary tuberculosis? (Five hands.)

How many think it is uremia? (Two hands.)

I do not think it is any of those things. I do not know what it is. I give it up.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Cholelithiasis.
Cardiac failure.
Dilatation of peripheral blood vessels.

DR. RICHARD C. CABOT'S DIAGNOSIS

None made.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesion*

Tuberculosis of adrenals (Addison's disease).

2. *Secondary or terminal lesions*

Chronic tuberculosis of the retroperitoneal and bronchial glands.
Chronic tuberculosis of the apices of the lungs.
Focal tuberculosis of the liver.
Ulcers of legs.

3. *Historical landmarks*

Chronic perihepatitis, perisplenitis and peritonitis.
Chronic pleuritis.

DR. RICHARDSON: This case had us all guessing in a way. I examined the skin as carefully as I could, and all I could make out in it was a slight dusky pallor, without any definite pigmentation; yet the case was one of Addison's disease.

The two ulcers on the leg were simple ulcers, not tuberculous. There was nothing in the peritoneal cavity except some chronic perihepatitis, perisplenitis and peritonitis. In the liver there was a small focus of tuberculosis. In the spleen there were no tuberculous lesions.

The gastro-intestinal tract and the mesenteric glands were negative. There were several slightly enlarged retroperitoneal glands with tuberculous lesions. The pleural cavities were obliterated by old adhesions. The bronchial glands were slightly enlarged. They showed a few small areas of fibrocalcareous degeneration. In the apices of the lungs there were foci of chronic tuberculosis. No tubercles were found in the lung tissue generally. The lung tissue was rather pale, with no definite edema.

The heart weighed 203 grams, quite small. Hearts are apt to run small in Addison's disease. The valves and cavities were frankly negative, with a good aorta and great branches.

The spleen was slightly enlarged. There were no definite tubercles. There was some hyalin degeneration of the vessel walls.

The gall-bladder, bile-ducts and pancreas were negative.

That brings us to the adrenals. The right was a roughly triangular mass six centimeters long on the sides, one centimeter thick, and practically consisted of fibrocaseous material. There was very little if any adrenal tissue made out. The left was a little larger than the right and consisted of similar material.

The kidneys weighed 195 grams, small but negatively macroscopically and microscopically. So we have here, with no definite manifestation of pigmentation of the skin, a case of Addison's disease.

DR. CABOT: I do not think we can blame ourselves much. I do not believe medicine is yet advanced to a point that would enable us to reason to a diagnosis of this case. We either have pigmentation in Addison's disease or we do not make the diagnosis. In practically all cases we do have pigmentation. But if we do not, from such indefinite heart and stomach symptoms as there are here we cannot really do it.

There are four things to be said about Addison's disease: (1) pigmentation, (2) low blood pressure, (3) cardiac failure, and (4) vomiting. She had some vomiting. She had well marked cardiac failure which we attributed to our glucose, and which I now believe was not due to glucose. She had a rather low blood pressure but nothing terrible, and she had no pigmentation. Under those conditions we are going to miss it every single time. What was the diagnosis that came down to you, Dr. Richardson?

DR. RICHARDSON: Cholecystitis and cardiac failure.

MISS PAINTER: Dr. L. M. Hurxthal suggested Addison's disease, but at the end they wrote down in the clinical record, "No diagnosis".

A PHYSICIAN: The pigmentation is generally considered an earlier sign than was apparently present here.

DR. CABOT: Yes, we expect it.

A PHYSICIAN: The high leucocyte count would throw one off, wouldn't it?

DR. CABOT: Yes. I do not know what that was due to.

A PHYSICIAN: Do you get such a sudden transition in Addison's disease?

DR. CABOT: This proves that we can. I never saw it before.

CASE 12332

ORBITAL HEMORRHAGE IN AN INFANT

CHILDREN'S MEDICAL DEPARTMENT

A girl eleven months old was brought to the hospital February 17 for swelling of the eyes.

There had always been difficulty in feeding the baby. Five weeks before admission she became more fretful and retained her food less well than usual. Three weeks ago she began to cry when touched anywhere. Three weeks ago while she was crying her right eye suddenly became swollen and prominent. Cold compresses brought no improvement. For some time there had been a little blood in the stools. Three days before admission the left eye also became swollen and there were a few drops of blood from the nose when she cried.

The family history was good. Three other children were living and well.

The child was one of twins, normally delivered at full term. The other twin weighed eight pounds. They were breast fed only two weeks, then for three weeks were given milk brought to a boil and an equal part of boiled water. A lactic acid formula was tried for a week but was not satisfactory; then a formula of half milk and half water, both brought to a boil, plus a little sugar. This was used until they were five months old. Then they were given a formula of three-quarters boiled milk and one-quarter water until a month and a half ago. Since that time they had been getting a mixture of evaporated milk, Mellin's food and water. They had had trouble with the feeding all along. The patient had diarrhea the summer before admission. She would not take orange juice. The twin brother

Shows the characteristic protrusion of the eyeballs due to orbital hemorrhage, and the flexed position of the legs.

took orange juice and was perfectly well except that he had not cut any teeth.

Examination showed a well developed and well nourished baby crying when approached and crying out when handled, but suffering in no way when let alone. The color generally was a pasty grayish sallow. The mucous membranes were pale. The skin was dry and very soft and flabby, with very little elasticity but no apparent sign of dehydration. On the contrary there was edema of both lids and puffiness of the face and legs. The head was symmetrical and pointed. The anterior fontanel was 2 cm. by 2½ cm. but not bulging. There were slight frontal bosses, but the forehead was definitely square. The hair on the scalp was rather thin, and in the occipital region absent. The left eyelids were swollen, the upper more than the lower. The upper lid was purple in the subcutaneous space (hemorrhage?). The right lids were swollen. Both eyeballs protruded, the right more than the left, being pushed downward and medially, showing a sallow sclera. Both pupils were regular, equal and reacted to light. There was no hemorrhage of the conjunctivae. The nose and ears were negative. The mucous membrane of the mouth was pale. There was definite hemorrhage in the upper gum near the only tooth, and suggestive hemorrhage in the lower gum. The hard palate was of the Gothic type, showing a purplish tinge. The chest showed Harrison's groove and rosaries at all the ribs, with equal expansion. The lungs were negative and clear. The heart was negative. The abdomen was extremely soft, the liver edge a centimeter and a half below the costal margin. The spleen was just felt. There was some glandlike mass in the left lower quadrant (lymph nodes?); no tenderness or spasm. She moved all the extremities, but not frequently. An attempt to make her stand on her feet was not successful. There was enlargement of the epiphyses at the wrists and ankles. There were no signs of epiphyseal perforation. The shins were not sharply defined, but there was only a little tenderness upon deep pressure in spite of the marked hyperesthesia. There was one bluish spot on the left cheek. There were several red papules or remnants of papules on the buttock and perineum.

Urine cloudy at thirty-one of thirty-five examinations, alkaline at seventeen, specific gravity 1.014 to 1.022, the slightest possible trace to a very slight trace of albumin at twenty-six of twenty-seven tests, none at one; sediment, leucocytes in great numbers at thirteen tests, many at eight, a few to very rare pus cells at thirteen, none at one. Blood examination showed 13,200 to 9,500 leucocytes, 53 to 73 per cent. polynuclears, 30 to 90 per cent. hemoglobin, 3,328,000 to 3,400,000 reds. The entrance smear showed great variation in size of reds, pallor, some polychromatophilia, no nucleated reds, no stippling. March 16 there was some variation in size, pallor. The platelets looked normal. April 31 leucocytes 10,600, polynuclears 73 per cent., hemoglobin 90 per cent., 4,900,000 reds, smear normal. Wassermann negative. February 17 blood calcium 10.9, blood phosphate 3.7, Wassermann negative, coagulation time 28 minutes, with calcium chloride 25 minutes, March 10 9.5 minutes. Bleeding time two minutes fifty-five seconds. Seven throat cultures and three nose cultures were negative. A Schick test and a Dick test were positive. Tuberculin tests, human and bovine, were negative. Four urine cultures showed colon-like bacilli, smear showed colon bacilli. Eye smear showed staphylococci and a few streptococci.

X-ray February 19. Both lung fields clear.

No evidence of enlarged thymus. Some thickening of the soft tissues surrounding the middle portion of the right femur and an area of diminished density running across the bone just back of the epiphyseal line. At the lower end of the femur this was quite marked, and there were similar changes in the ends of the other long bones. No evidence of periosteal separation or bone destruction. March 5 areas of increased density were seen running parallel to the shaft of the femur on each side in the bones of both lower legs. These areas suggested elevated periosteum. The irregularity of the epiphyseal line as previously described was still present. The upper extremities showed some irregularity at the epiphyseal line of the lower end of the radius and ulna, but no definite evidence of periosteal elevation.

Orders. February 17. Care in handling. Orange juice one half, water one half, three ounces of mixture four times a day. Milk seven ounces five times. February 18. Orange juice three ounces four times a day. February 20. Hexamethylenamin five grains three times a day, crushed and dissolved in water. February 22. Cod-liver oil one dram twice a day. Lamp treatment started with one minute dose twice a day, increasing one minute daily. March 2. Potassium citrate one-sixtieth of a grain in four ounces of water, one dram three times a day. Sodium bicarbonate five grains three times a day. Ice pack to right eyelid. March 7. Sodium bicarbonate five grains five times a day. March 12. Hexylresorcinol fifteen-hundredths of a gram. Theobromine and sodium salicylate. March 16. Sodium bicarbonate ten grains four times a day. March 19. Hexamethylenamin ten grains three times a day. Boric irrigation to left ear four times a day. March 22. Enema and forced fluids. March 23. Potassium citrate one-sixtieth of a grain in four ounces of water, one dram four times a day. Sodium bicarbonate ten grains four times a day. March 30. Acid sodium phosphate five grains and hexamethylenamin five grains every four hours for five doses. April 4. Acid sodium phosphate ten grains four times a day for four days. Sodium bicarbonate fifteen grains four times a day for five days. April 12. Two and a half per cent. hexylresorcinol in olive oil one dram three times a day. Do not force fluids. Omit acid and alkalies. April 15. Hexylresorcinol two drams three times a day.

The child made good general improvement during the first three days. The swelling of the lids went down considerably. The temperature ranged from 101.3° to 102.8° for the first three days and a half, then from 99.5° to 101°. By February 23 the hemorrhages in the gums had disappeared. February 25 the temperature rose to 105.5°. No new pathology was found. Next day the temperature fell to 99.5°. March 1 it rose again to 104.5°. The weight fell four ounces. Examination was negative, including the ears. The right lid was reddish and swollen and became worse, requiring an ice pack. The first urine specimen for several days was obtained March 3 and showed large amounts of pus and clumping. March 5 there was purulent discharge from the right external canthus. The conjunctivae were normal. Both lids were swollen. The next day there was profuse discharge. In the morning the lids were less swollen. An oculist said in consultation, "Probably orbital hemorrhage or periostitis. It seems to be improving. The fundi are anemic, otherwise negative." Next day there was slight discharge and the lids were not swollen. March 8 the child vomited once, and on the following day vomited again. The eye continued to discharge. The smear showed a few staphylococci. A catheterized specimen of urine now showed a culture of colon-like bacilli (Gram-negative) and two Gram-positive diplococci. (Cultures on four different media.) The urine was acid. The eyes continued to discharge slightly but were not swollen. March 15 there was profuse discharge from the right eye. As the organism was the colon-like bacillus no hexylresorcinol was used. March 17 the urine was alkaline for the first time, with large numbers of pus cells and clumping. The general condition was good. March 20 there was a discharge of pus from the left ear. The urine was now changed to acid and hexamethylenamin was given. March 27 both the liver and spleen were palpable. In the right flank a superficial mass with a sharp edge was felt, apparently connected with the liver. The ear was still discharging. March 23 the temperature, pulse and respiration went up and there were coarse râles at both apices. The right ear drum was red and bulging. Paracentesis was done. The left ear was discharging. The child did not look particularly sick. The râles persisted during the next two days. March 27 the third dose of Dick toxin immunization was given. March 28 the temperature was again up to 103°. No cause could be found. The urine was alkaline, with 10-20 leucocytes per high power field. March 29 the temperature came down, with corresponding increase of leucocytes in the urine. April 2 the temperature and the urine were normal. She was given hexylresorcinol. April 5 the left ear drum was bulging. Another paracentesis was done, and pus and serum obtained. By April 8 the temperature continued to range from 98.2° to 100° under acid-alkaline therapy. The right eye was somewhat displaced downward, the lid red and edematous. There was no discharge. April 18 the child was discharged from the hospital.

Discussion

BY JOSEPH GARLAND, M.D.

This girl was one of twins. The other twin always did well and does not concern this story at all. It is interesting to note that this patient would not take orange juice and that the twin brother would.

Her crying when touched anywhere is of considerable importance.

We note that there were some signs of rickets, —a square head and fontanels more open than is usual for her age; also a hemorrhage in the gum near the only tooth, and a suggestive hemorrhage in the lower gum. The enlargement of the epiphyses goes with the rickets which we know she has.

On admission, then, the story is concerned with the suddenly acquired prominence of both eyes, with feeding conditions, and with a great disinclination to be approached or handled. We see later that she also has considerable pus in the urine, with an irregular temperature.

Of course one might think of osteomyelitis in this case, but there were no X-ray or clinical signs that definitely suggested it. The blood also was fairly unimportant except for a relative rather slight anemia and a prolonged coagulation time. In other words we might think of a purpura hemorrhagica. But of greatest importance in making a diagnosis in this case are two things: the purely clinical signs of the sudden protrusion of the eyeballs, the hemorrhage into the gums and particularly about the tooth, the history of blood having been passed by stool, and the extreme disinclination to be touched. These features are all more suggestive of infantile scurvy than of any other condition. The history bears this out well, because of the fact that she has been fed on sterilized milk, milk with the antiscorbutic vitamin destroyed, and has not taken orange juice. We note that the twin brother did take orange juice and has had no symptoms suggestive of the same condition.

Protrusion of the eyeballs is not an uncommon finding in infantile scurvy. This picture (see illustration) shows two things very characteristic of infantile scurvy: the protrusion of the eyeballs due to an orbital hemorrhage, and the flexed position in which the legs are held. The X-ray itself, although not definite, indicates the cause for the extreme tenderness and the position of the legs, namely subperiosteal hemorrhage of the femora, particularly the right femur, which is the cause for the extreme tenderness.

In two years we have had three cases of scurvy showing orbital hemorrhage with protrusion of the eyeball.

Dr. Joe Vincent Meigs: Where is the blood behind the eyes—is it directly behind the eyeball?

Dr. Garland: It is inside the bony orbit and behind the eyeball; presumably subperiosteal.

Dr. Meigs: In this case, with a big spleen and spots in various places, why is it not purpura? I should think it would be necessary to have bleeding time and platelet count to rule it out.

Dr. Garland: It suggested purpura clinically, but the platelets were normal, and they are always reduced in purpura.

Dr. Jacob Fine: Did she look sick enough to suggest a streptococcus septicemia?

Dr. Garland: No, she did not seem sick enough for that, and on admission she had no temperature. The temperature appeared later coincidentally with the pus appearing in the urine.

Dr. Meigs: I should think there might almost be a connection between scurvy and purpura.

Dr. Garland: They act in different ways and show a different blood picture. Scurvy does not show a reduction in the platelets. We believe that the essential condition is not of the blood but rather of the lining of the vessels, which makes them permeable to the blood.

Miss Painter: The bleeding-time was two minutes and fifty-five seconds.

Dr. Garland: It was a normal bleeding-time then. The fact that makes us doubly sure of the diagnosis of scurvy is the therapeutic test. As soon as orange juice is fed and forced the symptoms clear up very rapidly. That happened in this case. There was a great improvement within twenty-four hours, and generally the acute symptoms, the pain on being touched, disappear within forty-eight hours.

Dr. Meigs: I should think that with an increased coagulation time it would be hard to rule out the fact that scurvy is a blood condition, not one of the cells or vessels.

Dr. Garland: I cannot answer that question. Ordinarily the orbital hemorrhages are rather slower in clearing up than the other signs. It is generally a week or ten days before the eyeballs have receded entirely into position. In this case the eyes showed a rather curious complication in that they began to improve and did improve markedly, and then, as the history shows, there was a complicating infection: "On March 5 there was purulent discharge from the right external canthus." The oculist made a diagnosis of "probably orbital hemorrhage or periostitis," examination negative. I believe that this recurrence of edema of the lids and of discharge from the eyes was a complication that is not ordinarily seen, and it was due to an infection supervening on top of a hemorrhage.

These cases always get well as soon as the diagnosis is understood; I want to say a word about it and if possible demonstrate through these X-rays. Of course we are accustomed to

making a diagnosis where possible on the lifting of the periosteum due to subperiosteal hemorrhage. But it is only in severe cases that we get this. Pelkan at the Children's Hospital has recently made an analysis of the X-ray findings in scurvy. He finds that there are these typical changes: (1) an irregular, broadened and well calcified epiphyseal line, which I feel that this case does show. We certainly have the broadened epiphyseal line, and there is no question but that it is abnormally irregular. The ordinary line of calcification is very smooth and regular. (2) The second sign, which is infrequently present, is a small spur at the lateral edge of the epiphyseal line, with occasionally a dislocation of the entire epiphysis. This spur is not demonstrable in these plates. (3) The scurvy line, an area of decreased density back of the epiphyses, representing lack of formation of the normal trabeculations. It is not easy to demonstrate, but I think we can see that there is back of this calcified area an area of rather markedly decreased density. (4) A very thin cortex, which I do not think we can say is exhibited here. (5) Glass-like transparency of the shaft with no trabeculation as seen in the normal bone or in rickets. Here again I think it would be hard to say that this sign is demonstrable here. (6) A broad edge on the centers of ossification of the epiphyses of the long bones.

The signs which he finds are present almost uniformly in the borderline or mild cases are the irregular and broadened epiphyseal line, which we certainly have here, the transparency of the shaft with absence of trabeculation, which I think we have difficulty in demonstrating here, and the irregular white edge on the epiphyseal center of ossification.

DR. FINE: How much of that is due to rickets?

DR. GARLAND: I think they almost always have rickets. I feel that almost every case of scurvy is superimposed on a rachitic background, because it is inconceivable to me that a child could exist on a diet which would allow him to develop scurvy without having developed rickets, rickets being as prevalent as it is.

DR. FINE: These X-ray signs must be due more to the rickets than to the scurvy.

DR. GARLAND: I think we have an original background of rickets, that this broadened and irregular epiphysis is rachitic, and that scurvy develops a lack of calcification behind the line and possibly also the irregularity, because healing rickets would show a very dense and smooth white line. Of course this case also shows a complication of pyelitis, and it is this complication that kept her for such a long period in the hospital. Various types of treatment were given for the pyelitis. At one time starting hexylresorcinol was considered, but that was not carried through because of the fact that her organism was the colon bacillus, which reacts less favorably to hexylresorcinol.

A PHYSICIAN: Is that the usual dose?

DR. GARLAND: The dose of hexylresorcinol for small children is from two or three-tenths to five-tenths of a gram three times a day, and the best way to give it to children is in a 2.5 per cent. solution of olive oil. In other words, a dram of the olive oil will provide one-tenth of a gram of hexylresorcinol. During hexylresorcinol treatment the fluids must be limited and no alkaline therapy used. The colon bacilli have, however, reacted so slowly to this treatment that it has been two or three months before any improvement has been shown, and we did not think it was worth while to continue it in this case. In any event the pyelitis cleared up and she was discharged apparently well.

DIAGNOSIS

Infantile scurvy.
Colon bacillus pyelitis.

CASE 12333

A QUESTION OF SURGICAL TREATMENT

SURGICAL DEPARTMENT

A Danish painter sixty-one years old was referred from the Out-Patient Department to the wards February 27.

For two months he had had loss of appetite and weakness. For four weeks he had had dull gnawing pain in the epigastrium coming on about two hours after meals, never severe, radiating, or accompanied by nausea or vomiting, and not relieved by food or soda. He consulted a doctor who told him he had indigestion and put him on a soft solid diet. Three weeks before admission he came home much exhausted and with the symptoms much aggravated. He gave up work and took to a diet of milk and liquids. He had no relief. He passed much gas. He felt that his condition had not become worse in the past four weeks. He had lost ten pounds during the past year, he believed nine pounds during the present illness, also much strength.

He had always been a strong and vigorous worker. He had had tonsillitis and rheumatism. Forty years before admission he had gonorrhea and chancre. Fourteen years ago his wife died of tuberculosis. For years he had taken a laxative daily. For three months he had had dyspnea with palpitation. For two months he had urinated twice at night. He was a stolid, conscientious Dane who gave a reliable history.

Examination showed a pale, rather sick looking but well nourished man. The tongue was rather pale and smooth on the edges. The teeth

were false. The heart was very slightly enlarged to the left. The sounds were of fair quality. A systolic murmur was heard at the apex and over the precordia. The artery walls were palpable, the brachials tortuous. The blood pressure was 135/80. The lungs were normal. There was a palpable tender mass in the epigastrium. A questionable liver edge was felt. The extremities showed varicosities. The pupils were slightly irregular. The reflexes were normal.

Before operation the urine was normal in amount, cloudy at two of four examinations, specific gravity 1.020; sediment, one to rare leucocytes at all of three examinations, rare granular casts at two. Blood examination showed 12,050 to 16,450 leucocytes, 79 per cent. polynuclears, 45 to 50 per cent. hemoglobin, 2,688,000 to 3,056,000 reds, slight achromia, smear otherwise normal. Clotting time eleven minutes. Clot retraction normal. Wassermann negative. Gastric analysis; fasting contents, 35 c.c. of foul reddish-brown mucoid liquid, no free HCl, combined HCl 6, guaiac very strongly positive. Test meal gave 20 c.c. of pale brownish-green fluid with undigested bread. No free HCl, combined HCl 8, guaiac very strongly positive.

A surgical consultant did not advise surgical interference unless X-ray should show a condition that might be relieved by palliative operation.

X-ray showed the stomach in the usual position. There was persistent irregularity involving the pyloric end of the stomach on the greater curvature. Peristalsis was regular down to this region, but was not seen to pass over it. Mobility was limited over the pyloric region, and some tenderness was noted. There was no six-hour residue. A very small amount of barium passed through the duodenum, which was not clearly visualized. The six-hour meal reached the cecum, which was normal, freely movable and not tender.

March 5 500 c.c. of blood was transfused. March 6 operation was done. The patient made a satisfactory operative recovery, and had no complaints. March 12 he was out in a chair. The temperature continued to range from 98.6° to 101.8°. March 15 he began to vomit blood, and in two days vomited thirty or forty ounces. He grew extremely anemic and weak. March 20 he died.

Discussion

BY EDWARD L. YOUNG, JR., M.D.

Lack of appetite and pain in the epigastrium should at once bring to mind several diagnoses one of which will probably fit in the vast majority of cases. When the patient is a painter of course lead poisoning becomes more probable. The two things to think of first are ulcer and cancer, and at his age, sixty-one, cancer becomes more likely than it would have been in early adult life. Of course there are a long list of things which can be present and have to be ruled out with further history and examination. The relation to meals suggests a gastric lesion, and the fact that it is not relieved by food or soda helps us very little.

The term indigestion, which is what he was treated for without any apparent examination, is one of the indefinite terms which ought never to be used by a physician in his own thoughts, because it is only a symptom and not a disease, and the causative factor behind it should always be hunted for.

Dyspnea with palpitation brings up the possibility of hepatic congestion from failing compensation as a possible cause of pain.

The note about the appearance of the tongue tells us pretty much what the examiner was thinking of, because the question has been very much to the front lately about possible relationship between lack of hydrochloric acid in the stomach such as does occur with carcinoma, and pernicious anemia, which also has a complete achlorhydria.

There is no evidence on examination that there is any failing compensation.

The palpable tender mass in the epigastrium together with the story would seem to make the diagnosis of carcinoma of the stomach very definite. The question now is whether any operative interference is justified. There can always be an argument about this, because we can never be sure, unless we operate, exactly how extensive a carcinoma is. One which may seem operable may show such an extent when the abdomen is opened that removal is out of the question, while another one with a palpable mass, which generally means that it is beyond help, may give a chance, if not for cure, at least for such a long time of relief that operation is more than justified. On the other hand of course examination with X-ray can give such a high degree of accuracy in all but the exceptional case that if the lesion seems too extensive it would seem wiser to avoid operation entirely. In this particular case there was no apparent obstruction, and the palpable mass and the extensive defect by X-ray would suggest that the situation was hopeless. Apparently however the patient's condition as he was seen in the wards led them to believe that there was a chance of relief, and operation was done.

I see no diagnosis to make other than carcinoma at the pyloric end of the stomach, and operation done on the chance that it might be small enough to remove. Of course if he had a pyloric obstruction a side-tracking operation would be justified where an exploration with either radical removing or nothing would be out of the question.

DR. YOUNG'S PRE-OPERATIVE DIAGNOSIS

Carcinoma of the stomach, pyloric end.

PRE-OPERATIVE DIAGNOSIS

Carcinoma of the stomach.

OPERATION

Ethylene anesthesia. Left rectus incision carried down in the line of the skin incision to and through the peritoneum without incident. Novocain was injected all along the site of the incision before it was made. On exposing the stomach a tumor the size of an orange was found attached to the lower side of the liver, involving the pyloric third of the stomach. The tumor was immovable and entirely inoperable. There would have been plenty of stomach above the disease after excision if the growth had not infiltrated the surrounding structures.

FURTHER DISCUSSION

As we feared from our pre-operative study, the situation is entirely hopeless and there is nothing to do but close the patient again. The further stories suggest that the growth broke into one of the larger vessels of the stomach and that he died of hemorrhage, because if he vomited thirty or forty ounces there may well have been more that went down into the intestinal tract.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Carcinoma of the stomach.
Secondary anemia from gastric hemorrhage.

DR. EDWARD L. YOUNG'S DIAGNOSIS

Carcinoma of the stomach.
Hemorrhage.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesion*

Adenocarcinoma of the stomach extending into the duodenum, with metastases in liver and retroperitoneal lymph glands.

2. *Secondary or terminal lesions*

Edema of the lungs.
Arteriosclerosis.
Hypertrophy and dilatation of the heart.
Soft hyperplastic spleen.

3. *Historical landmarks*

Operation wound.
Slight chronic pleuritis, left.

DR. RICHARDSON: He was a fairly nourished man looking as though he had lost weight.

Trunk. Skin and mucous membranes very pale. The abdomen was not distended. The wall was soft. There were brown red spots beneath the pectorals.

The peritoneal cavity and appendix were negative.

Stomach. The upper two-thirds of the organ showed a flat pale mucosa but at a point a short distance above the region of the pylorus there began an area of necrotic disintegration and ulceration which extended down and around the stomach wall involving the region of the pylorus and extending into the wall of the upper end of the duodenum. The upper margin of the area in the stomach wall was irregular and showed grayish homogeneous thickening of the wall in places. The lower margin of the area extended down to a point a little below the level of the gastro-duodenal artery. It ceased rather abruptly as an irregular necrotic margin. The process of necrosis and ulceration was well marked in the region of this artery and the gastric artery, and the wall of the area of ulceration was adherent to the left lobe of the liver. In this situation it was in close association with large masses of new growth tissue in the liver. One of these masses which was more or less continuous with the ulcerated wall showed rather firm grayish homogeneous peripheral portions surrounding broken-down central portions, markedly infiltrated with brownish red semifluid blood-like material. The necrosis and ulceration were so extensive that the usual landmarks were lost. At one place in the lower part of the area the necrosis extended nearly through the peritoneum, which broke on manipulation.

The mesenteric glands were negative. The retroperitoneal glands in the region of the stomach, the abdominal aorta, the head of the pancreas and the lesser omentum were enlarged up to two centimeters across. They showed pigmentation and were infiltrated with new-growth-like tissue.

The intestines below the first part of the duodenum were negative. The mucosa was very pale.

The liver was five centimeters below the costal border.

There were a few pleural adhesions at the apex on the left. The trachea and bronchi contained much pale frothy fluid.

The lung tissue showed marked edema.

The heart weighed 390 grams,—large. The cavities on the left showed slight dilatation, on the right much dilatation. The columnae carneae were rather flat. The myocardium was flabby. The valves and coronaries were negative. The aorta showed a moderate amount of arteriosclerosis with a few areas of atheroma. The great branches showed a slight amount of fibrous sclerosis. The pulmonary artery, veins, venae cavae and the portal vein and radicles were negative.

The liver weighed 2630 grams,—considerably enlarged. Scattered over the surface were

many smaller and larger bosses of new growth tissue. In the substance there were numerous smaller and larger similar masses of new growth. These masses of new growth tissue generally showed grayish peripheral portions surrounding central portions which in instances presented hemorrhagic areas and areas of softening; in others the central portions were broken down and markedly infiltrated with brownish red semifluid blood-like material.

The spleen was slightly enlarged and mushy.

A case then of carcinoma of the stomach extending into the duodenum with extensive ulceration and with metastasis in the liver and retroperitoneal glands. An unusual picture.

THE SMALLPOX PROBLEM IN TENNESSEE

THE prevalence of smallpox in Tennessee for many years led the Health Commissioner to institute a smallpox survey in 1925. The population as of January 1, 1920 was 2,337,885 with about twenty per cent. of negroes. The state has 95 counties. There were eight cities having 10,000 or more persons, Memphis being the largest with 162,351. There was a large unvaccinated number of people throughout the state.

The law provides that local health officers and boards of health may adopt compulsory vaccination without authorization of the State Board of Health. Some cities and towns have ordinances requiring compulsory vaccination for school attendance but this requirement has not been generally enforced. During a ten year period 1916-1925 there were 18,851 reported cases of smallpox but thirteen counties reported no cases. No information was obtainable in eleven counties during this ten year period. For five years preceding the survey there were 110,932 vaccinations. In 1924 the number of smallpox cases was 3,145; in 1925 there were 1810. It may be that the drop was influenced by the general interest shown during the survey. In a general way it may be said that Tennessee previous to this survey presented a demonstration of the result of inadequate protection against smallpox.

The difficulties met with by health officers are as follows:

1. Ignorance and exaggerated stories of bad results following vaccination.
2. Opposition aroused by enforcing quarantine regulations.
3. General opinion that the disease is mild and is less severe than the results of vaccination.
4. Lack of aggressive support by physicians.
5. Lack of support by officials of large industries.
6. Lack of financial aid by county officials.
7. Tendency and ability of certain classes to secrete the disease.
8. False conception of personal liberty.
9. Opposition from certain religious sects.
10. Tendency of some local officials to suppress knowledge of outbreaks for commercial reasons.

The prevailing sentiment in the medical profession and among health officers in Tennessee is that "quarantine measures are often ineffectual and that persons refusing vaccination on the grounds of restriction of personal liberty or otherwise should not be compelled to subject themselves to quarantine restriction. It is argued that such a course would emphasize the importance of vaccination and encourage its practice. Until, however, we can secure vaccination of all minors and irresponsible persons, until vaccination is an equal protection against the most severe as well as the milder forms of the disease, and until vaccination becomes an absolutely reliable procedure, with the use in every case of a vaccine of unquestionable potency and the most approved technique followed by a careful reading and an accurate interpretation of the result, the elimination of the strictest possible quarantine is inadvisable."

THE LA-MAR REDUCING-SOAP FRAUD

A POSTAL-FRAUD order issued against the La-Mar Laboratories, H. J. Brown, Manager, Cleveland, Ohio, has stopped the fraudulent advertising of this company appearing in local papers. The product was advertised to the public under such claims as "Wash Away Pounds of Fat, Double Chins, and Years of Age with La-Mar Reducing Soap"; "Shrinks the Skin as it Dissolves the Fat."

The scheme was based on false promises and fraudulent misrepresentation involving an expenditure in advertising of between $125,000 and $150,000 a year. The soap sold at 50 cents a bar, and a Slen Mar Reducing Brush to be used in conjunction with the soap sold at $3.

Brown, the promoter, has been connected with similar schemes in the past, notably in connection with "Tescum" and "Nicotal," which he promoted through the H. J. Brown Medical Co. as cures for the alcohol and tobacco habit. "Tescum" was analyzed by the Dairy and Food Division of the Board of Agriculture of Ohio, a few years ago and found to consist chiefly of tartar emetic—three cents' worth of this dangerous irritant poison being sold for one dollar. —*Boston Better Business Bureau.*

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CHIROPRACTIC LEGISLATIVE ACTIVITIES

This cult is making a determined effort to secure recognition by Congress. According to certain letters which have been published, two thousand chiropractors are writing to congressmen appealing for the enactment of a law which will provide for chiropractic treatment for disabled veterans.

These practitioners claim that there are two objectives, one for humanitarian treatment of these veterans, and the other, putting chiropractic on a "secure national basis."

The bill in question is Senate 4124, amending 10240. Each chiropractor is urged to send five letters at least naming Senators Reed, Smoot, Richard Ernst, Simmons and George as especially influential members of Congress. Also each chiropractor is asked to write to his own state senator and representative. Further advice reads as follows: "Get these letters streaming out of your community—at the rate of 50 to 100 daily." Also circulate petitions which may be sent to George B. West, Washington, D. C.

One heading reads: "Make chiropractic available to each disabled veteran at Government expense." One choice excerpt is "Satan, the greatest surgeon and dope shooter of all, slices off fifty years from each normal life span. One hundred and twenty years is the age for which every man is entitled to hope if he obeys the law of God and keeps his backbone normal." The physician is spoken of as "the Medical Hun who has a strangle hold on the lives of these sick and suffering men." The claim is made that chiropractic can restore those men who have been pronounced incurable by the medical profession.

The result of this propaganda will be a matter of considerable interest for it will give a better understanding of the mental status of the Congressmen, we believe, than will be brought out by the study now being endorsed by Congress.

AUTOMOBILE ACCIDENTS

From a statistical study of the frequency of street accidents due to automobiles made by the Metropolitan Life Insurance Company in association with Colonel Sinke, Director of Public Safety of Grand Rapids, the important factors were found to consist first, in the density of traffic, and second, in the period of the day. During daylight accident frequency is proportional to the square of traffic density. That is, doubling the traffic density quadruples the accident frequency. The frequency at night is higher than by day, and singularly, lower traffic density at night increases the hazard for when the streets are comparatively deserted, cars are driven at higher rates of speed, but doubling traffic density at night only doubles the accident frequency.

Of course, it should be recognized that defective vision of the driver adds to danger in the night more than during the day. In most accidents there is a personal equation to be found.

Statistics deal largely with figures whereas there is much more to be learned in a study of automobile accidents beyond that shown by statistics, for the individual driver may add to or detract from the statistical feature of a report, according to the average intelligence and prudence of types of people.

DIPHTHERIA IMMUNIZATION IN BUFFALO

In 1919 Buffalo had 3589 cases of Diphtheria. It is to be assumed that many of these cases were treated with antitoxin. The death rate that year was nearly ten per cent., a great advance over the rate of pre-antitoxin days.

Immunization by toxin-antitoxin began in 1921. The number of cases of diphtheria in 1925 was 356 with 31 deaths. The rate remains about the same after the disease exists but the number of cases is so much less that credit may fairly be given to the immunization procedure.

Buffalo joins the rest of the State in the war cry "No Diphtheria by 1930." This happy condition will be brought about all over the country if all infants are immunized before six months of age. Diphtheria is more common and more deadly in the age period between six months and five years.

Every general practitioner is especially responsible for the dissemination of useful information among parents with respect to all communicable diseases.

THIS WEEK'S ISSUE

CONTAINS articles by the following authors:

MEIGS, JOE VINCENT, A.B.; M.D. Harvard Medical School 1919; Assistant Surgeon, O. P. D. Massachusetts General Hospital and to the Collis P. Huntington Memorial Hospital, and Surgeon to Vincent Memorial Hospital. His subject is "Adenomyomata or Tumors Composed of Endometrial-like Tissue," page 343. Address: 286 Marlborough St., Boston.

RACKEMANN, FRANCIS M.; A.B.; M.D. Harvard Medical School 1912; Physician to Out-Patients, Massachusetts General Hospital; Instructor in Medicine, Harvard Medical School. Address: 263 Beacon St., Boston. Associated with him is

KING, DONALD S., A. B.; M. D. Harvard Medical School 1918; Assistant in Medicine, Harvard Medical School; Assistant Physician Out-Patients, Massachusetts General Hospital. Address: 205 Beacon St., Boston. They write on "Bronchial Asthma—The Role Played by House Dust and Bacteria," page 347.

STURGIS, CYRUS C., S.B.; M.D. Medical Department, Johns Hopkins University; Assistant Professor of Medicine, Harvard Medical School; Physician to the Peter Bent Brigham Hospital; Member of Society for Clinical Investigation. His subject is "Angina Pectoris as a Complication in Myxedema and Exophthalmic Goiter," page 351. Address: Peter Bent Brigham Hospital.

WASHBURN, FRANK H., M.D. Tufts College Medical School; F.A.C.S.; Surgeon and Chief of Staff, Holden District Hospital; Consulting Surgeon to Rutland State Sanatorium. His subject is "Rural Medicine in Worcester County: Retrospective and Prospective," page 354. Address: Holden, Mass.

HUBER, EDWARD G., Detailed Record on Page 291, No. 6, Vol. 195. Continued article on "The Control of Communicable Diseases Prevalent in Massachusetts," page 360. Address: War Dept., Washington, D. C.

PEMBERTON, FRANK, S.B.; M.D. Harvard Medical School 1909; F.A.C.S.; Assistant Visiting Surgeon, Free Hospital for Women; Instructor in Gynecology, Harvard Medical School. He writes on "Progress in Gynecology," page 371. Address: 198 Commonwealth Ave., Boston.

CORRESPONDENCE

CASES OF IMPERFORATE ANUS

August 4, 1926.

Editor, Boston Medical and Surgical Journal:

The excellent article by Dr. Seth Fitchet appearing in the issue of July 1, 1926, entitled "Imperforate Anus," interested me both in the classification and the treatment with results. While in Shanghai at the Margaret Williamson Hospital during the year 1922, five cases of imperforate anus came under my care. Two of these were perhaps of sufficient interest to report.

One, a male Chinese, 7 days old, seems to fall partly in Class III and partly in Class IV of Dr. Fitchet's division. There was complete absence of anus and rectum, with fecal discharge through the urethra. An exstrophy of the bladder divided the scrotum through the median raphe. The penis was rudimentary and the halves of the scrotum so small as to be almost unnoticed, the exstrophied bladder at first sight being taken for an excoriated scrotum. Access to literature on the subject was then not possible and it was diagnosed as persistent cloaca. It may have been a vesico-sigmoid fistula. An incision was made at the normal site of the anus and a loop of large bowel opened and sutured to the edge of this incision. The infant was taken home that night in good condition but was never heard from after.

The other case was that of a female Chinese 6 months old with feces coming apparently from the vaginal orifice. There was no anus. A careful examination revealed no vaginal fistula but a tiny opening at the right of and a little above the vaginal orifice, from which the feces came. This proved to be into the rectum, which was dissected from its misplaced moorings and an attempt made to anchor it at the normal site after enlarging its opening by merely paring off the constricted end. A much larger exit was thus given for the feces, which were becoming too solid for the small orifice found, but the perineal sutures did not hold, so though the child left the hospital ten days later in good physical condition it was felt the operation was a failure. The parents were requested to return later for further plastic work, but, as so often happens in that country, the child never was seen again.

While not a subscriber to the JOURNAL I am a loyal reader and consider it one of the best published. Am in this country on sick leave, not permanently.

Sincerely yours,

LOUISE M. INGERSOLL, M.D.

77 Montford Avenue, Asheville, N. C.

REPORTS AND NOTICES OF MEETINGS

THE NEW HAMPSHIRE SURGICAL CLUB

THE New Hampshire Surgical Club will hold its annual meeting at Hanover, N. H., Sept. 6. Preparations already under way indicate that the meeting will be a huge success.